Smithsonian

September 1995

DINOTOPIA

The magical world of James Gurney (p. 70)

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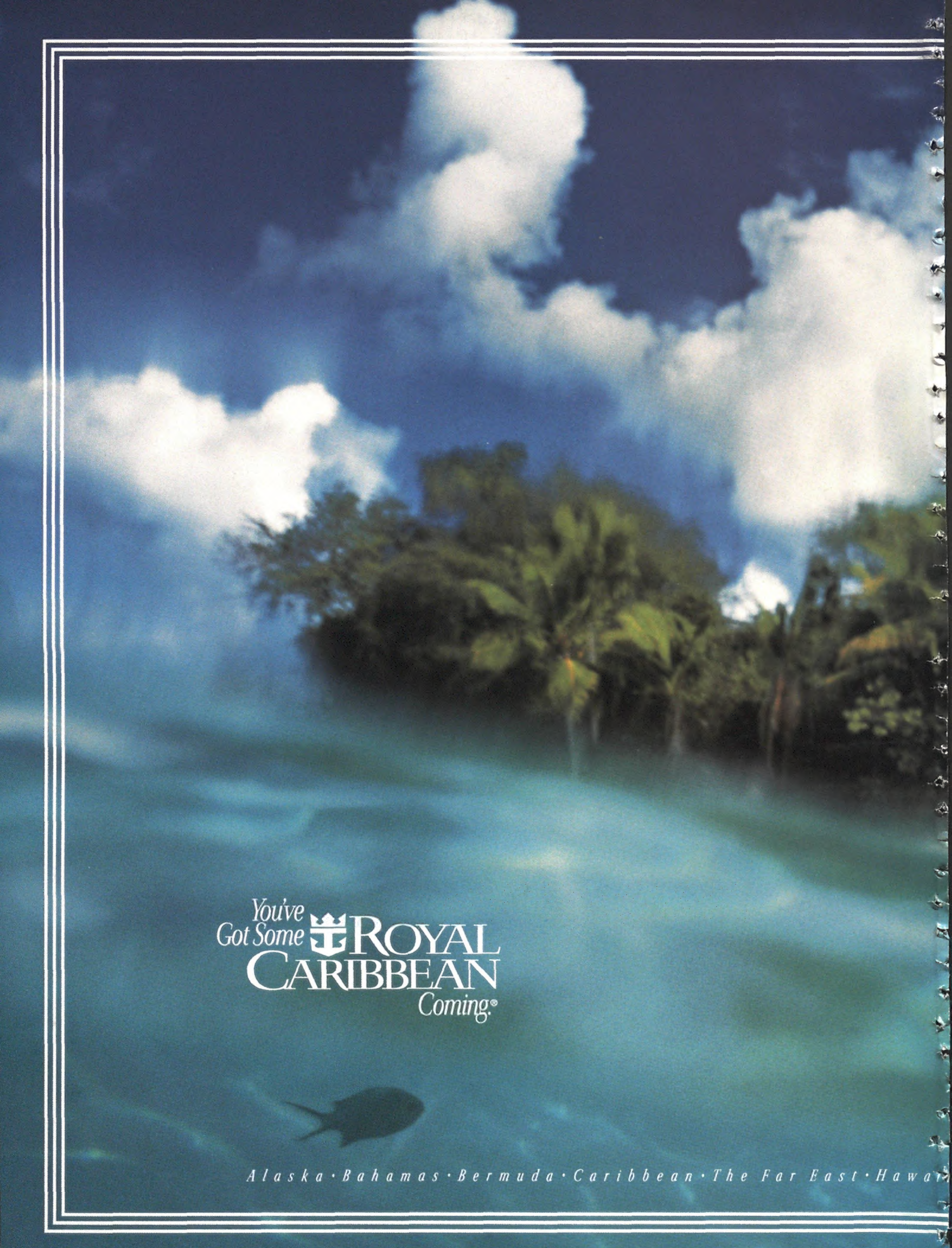
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September 1995

Smithsonian

Volume 26, Number 6

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Cover: In this scene from author-artist James Gurney's new book, *Dinotopia: The World Beneath*, hero Arthur Denison and his son, Will, take a ride in a dinosaur taxi. The year is 1867, the place, Waterfall City—"a combination of Niagara and Venice," says Gurney, whose sons modeled for the boys in the lower right-hand corner. Why is he so fascinated by dinosaurs? Because "they're on that balance point between fantasy and reality" (p. 70)

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Secretary Heyman's comments

Smithsonian Perspectives

Exhibits at the National Museum of American History commemorate our diverse World War II experiences

A number of exhibitions commemorating aspects of World War II are now on view at the National Museum of American History. I would like to devote this month's *Perspectives* to three of them because each evidences the Smithsonian's concern for meaningful events in our national history and because each one is entirely different from the others in its approach. (As readers of this column know, I have been seeking to understand the proper range and nature of Smithsonian exhibitions.)

One of the exhibits—"GI World War II: The American Soldier Experience"—consists of more than 400 objects and graphics, from rifles and canteens to uniforms and photographic portraits, even a portion of a World War II barracks with cots covered by tight blankets and with footlockers at their base. Dog tags, campaign ribbons, medals, bayonets and other World War II artifacts are displayed closely together and in profusion. Accompanying text provides some background.

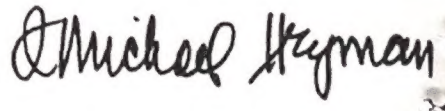
This is a step away from the more traditional kinds of military exhibits that might show numerous uniforms, rifles and the like but are devoid of context. This exhibit evokes memories for those who served in the military during the time. But it tells no stories, and it is hard for those who were not in the Armed Forces to relate intimately to the objects. They are interesting but not deeply meaningful.

Contrasting with this exhibition is "World War II: Sharing Memories." This is a collection of everyday objects used by people at war and on the home front, such as a Jeep, posters, books and a host of other ordinary objects. The staff of the museum even shared typical, everyday items from their own personal collections. Popular music from the era plays in the background. There are paintings of military scenes commissioned by the Armed Forces during the war and books of photographs of contemporary scenes. The objective is to stimulate memories through objects and images that connect viewers with their own remembrances of the times. It seems to work well. Visitors are asked to write down their memories, and literally volumes are being produced. Some remember their own participation. Others write—often as short stories—about the men and women in their families who served, and those who waited and worked. In addition, there are weekly lectures on related World War II topics.

"World War II: Sharing Memories" is designed to accomplish a particular purpose. The curators wanted people to participate by remembering personal and family involvements, and they selected objects and exhibited them in a manner so as to be as evocative as possible. There is a home flag with a blue star for a loved one in service (a gold star would have been for one who died), flags that were awarded to factories for exemplary production and labor-management cooperation, quotations from famed WWII cartoonist Bill Mauldin about what it was like at the front, and others. But there is no definite story line in the exhibit, and there is only a little commentary on what seems unbelievable now—most prominently, racially segregated military units.

This takes me to a third exhibition—one that has been on display for a good many years: "A More Perfect Union: Japanese-Americans and the United States Constitution." Here you have an exhibition that tells a big story—the internment of Japanese-Americans during World War II, the impact of the internment on them, the valor and success of the Japanese-American military units in the European theater, and the eventual official recognition by the U.S. Government that what had occurred was wrong and that reparations were deserved.

Unlike the others, this exhibition is based on a central idea that integrates objects and text: the inconsistency of the treatment of Japanese-Americans with the basic ideology of the United States, as expressed in the equal protection clause of the Constitution. Obviously, this kind of exhibition can be quite controversial. Many observers do not interpret the events in the same way as do the curators. Nevertheless, it is stirring and makes us all confront the distance that sometimes exists between behavior and ideals. While I understand that some visitors may disagree with some of the themes, occasional exhibits of this kind are justified in an institution dedicated to the diffusion of knowledge. One can look at the gap between performance and promise negatively—as a failure of our system of governance. But I prefer to look at the gap as an ongoing positive challenge—a challenge that often is met by our self-correcting and flexible system.



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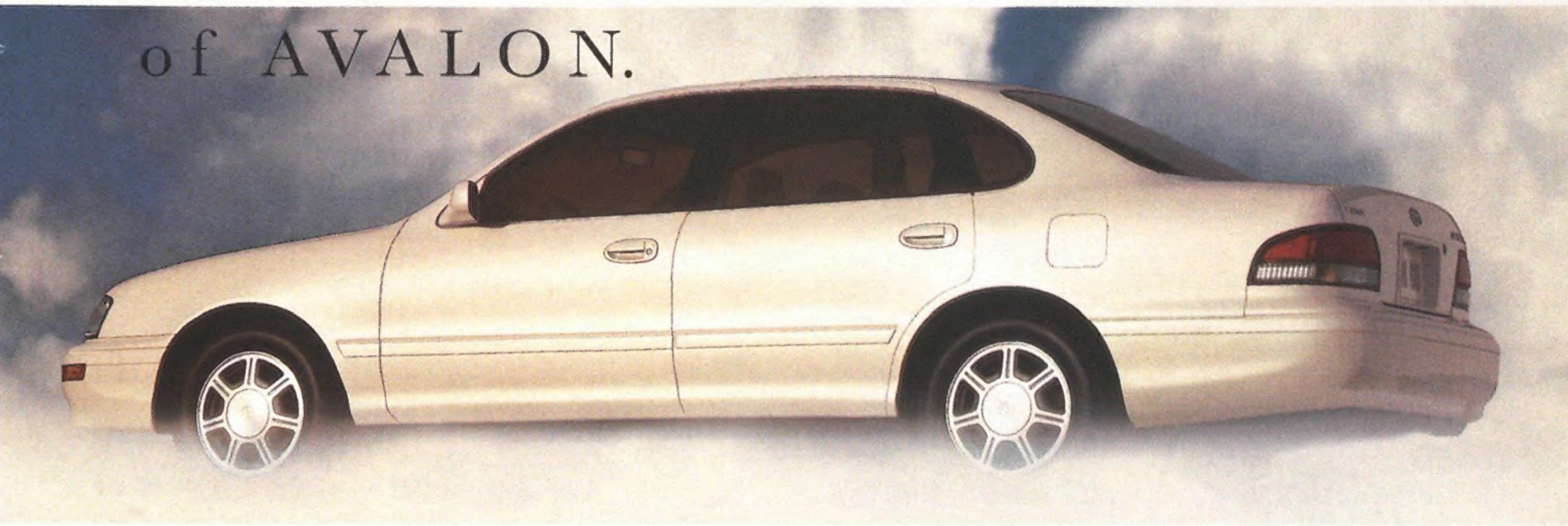

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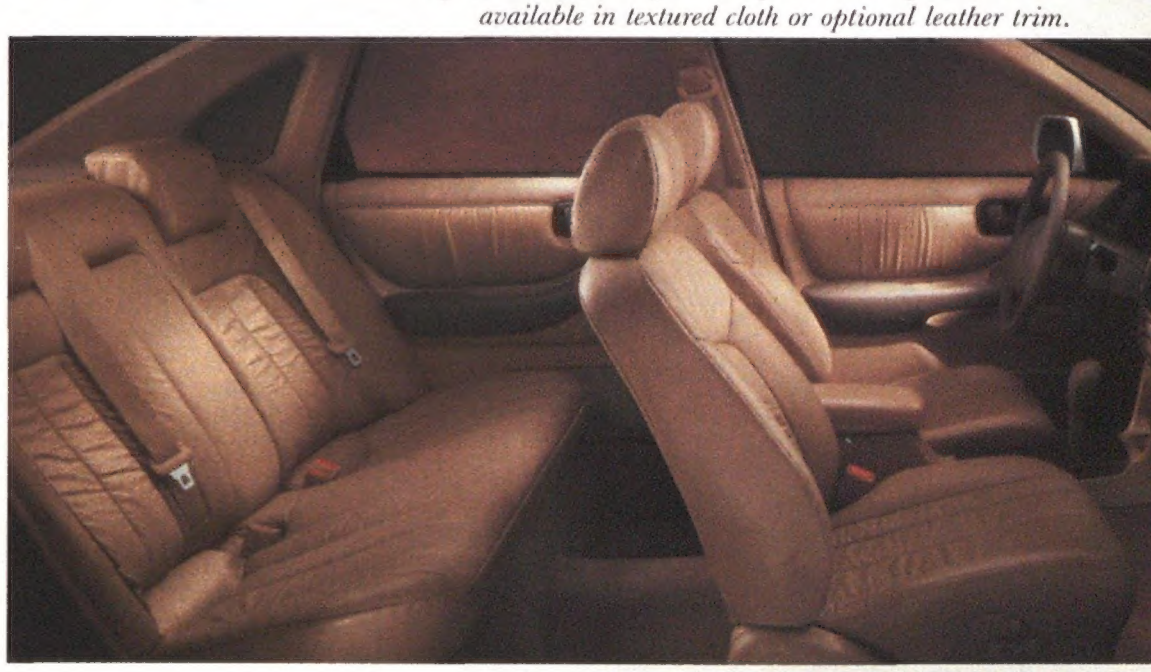

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Letters to the Editor

Herman Melville

Dear Sir: Robert Wernick's article about Herman Melville in the July issue prompts me to write about my ancestor Isaac F. Sawtell. In 1845 he became captain of the *Ann Alexander*, a small New Bedford whaler first launched in 1805. Sawtell skipped one voyage to marry my great-grandmother, leaving his first mate, John S. De Blois, in charge. During that trip, on August 20, 1851, a wounded sperm whale rammed and sank the *Ann Alexander* after first biting two of her whaleboats in half.

Herman Melville had just published *Moby-Dick*, and in a letter to the local press he wrote: "Ye Gods, what a commentator is this *Ann Alexander* whale! I wonder if my evil art has raised the monster!"
Frank D. Kasson
Thousand Oaks, California

Dear Sir: Your fine article fluffs over the subject of who the scholar was that began the rediscovery of Herman Melville in the 1920s, rescuing the all-but-forgotten author from oblivion. The remarkably prescient student was Raymond Weaver, who became a professor at New York's Columbia University. In 1921 Weaver published a scholarly biography of Melville, a book from which, a later expert said, all "modern Melville scholarship flows."

During his research, Weaver befriended Melville's relatives, who allowed him access to items that had belonged to the writer. Among these items were numbers of Melville's letters and his superb last prose work, the short novel *Billy Budd*, which Melville had scribbled on small pieces of notepaper.
David S. Thomson
Alexandria, Virginia

Dear Sir: Fans of Melville can reach a new home page about him through the World Wide Web (http://www.melville.org).
Howard D. Fencl
Rocky River, Ohio

Fleas

Dear Sir: A favorite rhyme from my childhood is Roland Young's "The Flea": "And here's the happy bounding flea— / You cannot tell he from she. / The sexes look alike, you see; / But she can tell, and so can he."
Annie D. Clure
Lancaster, Pennsylvania

Dear Sir: Richard Conniff wrote that the "champion leaper among fleas" can reach an apogee of about ten inches and land in 1.2 milliseconds. His pesky flea must be an amazing creature. Even in a vacuum it would take 0.456 seconds to complete such a leap.
A.J. Faustini
Oakland, California

Dear Sir: Mr. Conniff became interested in flea research while trying to discourage his children from getting a cat. Was he successful or were they?
Mary Slusser
Washington, D.C.
The children prevailed. Tory and Sammy (below with a close friend) are the latest additions to the Conniff household. Ed.

Around the Mall

Dear Sir: I may have the all-time Ed Bearss story, which occurred approximately four or five years ago at a Civil War Roundtable Associates' Seminar. During dinner on Saturday night, which is the traditional time for Ed to give his banquet speech, Ed's windpipe became obstructed when a piece of roast beef got lodged in it. The people on the dais made repeated yet unsuccessful attempts at the Heimlich maneuver. Jerry Russell, who runs the Associates' program, knew I was in the audience and asked me to take a look at Ed. As I approached the dais I could tell that Ed was unconscious. Thoughts raced through my mind of whether our steak knives were sharp enough to perform a tracheotomy. My first attempt at the Heimlich maneuver—and the only one in 20 years of practicing medicine—was successful. Slowly, Ed regained consciousness. Shortly after, I returned to my seat quite shaken, but Ed arose and delivered his usual excellent post-banquet lecture.

Ed is, indeed, a national treasure and one tough marine.
Robert E. Zaworski, M.D.
Atlanta

Dear Sir: It is no surprise that for a full week Jeb Stuart's cavalry "remained cut off from the Army of the Potomac"—a.k.a. the Union forces. You meant the Army of Northern Virginia, the Confederate forces.
Stephen C. Twomey
Minersville, Pennsylvania

Crash-test dummies

Dear Sir: I found the comment on page 81 by a General Motors physicist about a Corvette accelerating from zero to 30 mph in six seconds rather amusing since my 1983 Volvo with 220,000 miles on the odometer can do that.
Keegan L. Patterson
San Diego
We have heard from one reader whose 20-year-old Corvette still steps out, traveling from zero to 60 mph in six seconds. Ed.

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habitat

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Around the Mall and Beyond

By Michael Kernan

To teach elementary school science, says the ten-year-old National Science Resources Center, there is nothing better than getting young hands on simple experiments to learn more about the world

NSRC's Sally Shuler (center) and the staff use a board game to show classroom innovators how to get the education establishment to commit to hands-on science.

I recently attended a conference sponsored by the Smithsonian and the National Academy of Sciences (NAS), and it reminded me of Miss Wells, my fifth-grade teacher at the Utica Country Day School in Utica, New York.

We were studying ancient Rome, and Miss Wells told us about the aqueducts with their stone arches. She actually got us thinking: What made them stay up? Why did they need a keystone?

Books didn't tell us much, so Miss Wells had an inspiration. We would build a Roman arch.

It took all fall. We constructed little cardboard boxes and poured in plaster of Paris to make our bricks, and piled them up in a somewhat rickety arch.

Halfway through, I decided I knew all I needed to know about arches, so went off and built a working guillotine. "A guillotine?" said Miss Wells in a tone of admiration and panic. "Yes. Well, all right, Michael."

It was one of those Thirties progressive schools, you understand. The guillotine was displayed without comment alongside the arch at the school fair.

So. Back to the conference, and none too soon. It is called the Elementary Science Leadership Institute, and it is run twice yearly by the ten-year-old National Science Resources Center (NSRC), a jointly operated Smithsonian and NAS program. The NSRC's mission and the purpose of the Institute is to help American students catch up with the world in science. Scott Stowell, a curriculum coordinator from the Spokane, Washington, public schools and a member of the Resource Team, put it this way:

"One of the United States' eight national education goals is being first in the world in science and math. The only way is to have a strong kindergarten through 12th grade program. Computers are just one tool. To understand the ideas of science in a meaningful way, you need to do experiments."

"Hands-on" is the magic word here. Having discovered that the regular old textbooks were not exactly thrilling, the education industry for some years now has been trying in a systematic way to let children all across the nation—especially in the first seven grades, K-6—do some simple experiments, get their hands on rocks and wires and small living things. A number of companies and nonprofit organizations have put together kits for teaching them.

The problem, as with any new idea, has been to interest the people who run the schools and control the way things are taught. And this is what the Institute is about. Its initiators are way ahead already.

"We haven't bought a textbook in 21 years," said Susan Sprague, a pioneer in the program and the director of science and social sciences for the Mesa, Arizona, public schools.

To date, some 300 districts, covering from 3 to 78 schools each, have sent delegates here, leaders whose decisions influence at least four million students. This year, in two summer programs, 36 districts were represented, plus one school district each from Mexico and South Africa.

After a breezy introduction featuring a lot of talk about what to wear to dinner, the group, 140 strong, settled down to lectures, demonstrations and some powerful networking.

As many as three hands-on workshops were scheduled at once, with such titles as "The Human Body" for grades three and four, "Lifting Heavy Things" for the second and third grades, and "Food

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Toucan

Chemistry" for grade four. The only thing that wasn't hands-on was the language. For example, the Institute's goals for "systemic reform" include: "Construct a model for leadership development in elementary science education that can be used to cultivate other leaders in their communities," "develop strategic plans," "identify and assess," "implement inquiry-centered elementary science programs" and so forth. It's the jargon of the boardroom, full of Latinate words with plenty of suffixes and short on action verbs.

But to my surprise we got on fine just the same. It was amazing how much everyone could agree on. Asked to list their goals, the group came up with almost exactly the same priorities as in previous years: to get the children to relate concepts to the real world; to see science as a wonder; to learn to use technologies, including libraries; to know what questions to ask; to know when to take risks and to communicate their discoveries.

For me, the heart of the weeklong conference was the "Making Change Game." This is a board game, incredibly complex, that everyone plays, each of the teams working as a unit. Its purpose is to demonstrate that "change is not an event, but a process."

There are 24 tokens representing teachers, school superintendents, parents, school board members and local business people. The idea is to progress from wanting "Information" to expressing "Interest" and on to a total commitment to the program—in this case, hands-on science.

Some of the 24 token figures are described in the accompanying handouts as gung-ho from the start; others are born resisters. Each team works independently, taking as many turns as it wants. First, the team decides on one of several options: to chat up individuals, to hold a special assembly, to approach the school board, to attempt a film fair or demonstration. Then the team's runner takes its proposed strategy, along with the required fees (from a supply of plastic coins representing the budget), to the judges. The judges send back a response that has been worked out from a formula, translating the proposal into so many moves on the board for one, several or many tokens. For example, a school assembly, if called too soon in the game, might prove a bust, while the same tactic later on could move everybody ahead. Gradually the 24 tokens, or most of them, move across the board—elementary teachers and business people usually in the lead, naysayers lagging behind—to produce a final score measured in student benefits.

"It's about persistence," said Sally Goetz Shuler, the NSRC's deputy director for development, external relations and outreach, and a key leader of the Institute. "It shows you what you have to do to bring about change. Also, you learn that the object is not just to convert staff but to benefit students."

Certainly the team members seemed to get the message as they worked feverishly against the clock to gain the backing of administration leaders, varying their approach when necessary, trying to reach the critical mass of opinion that means an idea's time has come.

The game is fascinatingly realistic, and more than one player remarked that it should be computerized and adapted to city government and other situations where one person's bright idea is not enough because it requires the approval of a whole apparatus of administrators, elected leaders and assorted defenders of the status quo.

To me, one of the game's most interesting points has been the perception, early on, that administrators and community business leaders should be added to the process.

"In '89, when I was a participant," said Scott Stowell, "they didn't have anyone from the central office of administrators as part of the team. We had just the principal from Spokane, myself and another teacher. The districts are structured with a hierarchy of authority, and it was hard for us to get quickly the level of support that we needed."

So the Institute started inviting superintendents and scientists and business leaders from the community, making them part of the solution rather than part of the problem.

Today, Stowell said, the Spokane school system "is in the process of a major implementation at the K-6 level." It is even working up its own set of hands-on learning kits to go with the commercial ones already in use.

The kits on the market are rigorously tested for reliability and teaching value. The Full Option Science System, for instance, put out by the University of California and the Encyclopedia Britannica, has modules in four areas—life science, physical science, Earth science, and scientific reasoning and technology. The kits involve such basic scientific studies as levers and pulleys, magnetism and electricity, air and weather, water, insects, and the physics of sound. They are telling both the students and the teachers that learning can be fun.

We had a demonstration workshop in "Floating and Sinking"—one of 24 curriculum units developed by the NSRC. Each team was given a kit that included little cylinders of wood, metal and plastic, a mystery cylinder, a scale and a pail of water. We were supposed to find out what we could.

Right away our team determined that the wood floated and the metal sank. One cylinder was hollow, a tiny bucket, and this obstinately stayed erect on the water because, as we determined, it was light and had a large air space inside it.

We took bets on the plastic one. I said it was Teflon and predicted it would sink. Everyone else said no, it was nylon and would float. It floated. Turned out it was polyethylene.

Anyway, we turned next to the mystery cylinder. What to do? We tried weighing all of the candidates and learned, first of all, that the scale measured, not in ounces or grams, but in paper clips. There was a lesson right there: weight units are arbitrary; they can be dimes or horseshoes or eclairs, as long as you use them consistently.

We found that all the cylinders that sank weighed more than 7.5 paper clips (we had calibrated half-paper clips on our scale). And the mystery cylinder weighed 10.5 paper clips. Therefore, we predicted, it would sink. It did.

By this time, most of the teams had completed their experiments and were going on into new investigations by themselves. Our bunch, curious as ever, subjected the hollow cylinder to a test for floatability limitations.

It stayed up even when nearly full of water and sank only when, with water being added drop by drop, its rim slipped below the surface.

You could read a textbook all day and not find out something like that. Around us, people were getting noisier. Some were roaming from table to table. Some were laughing. Some were looking as if they might start throwing cylinders of water at any moment.

"They're out of control!" muttered Sally Shuler. And she sounded just like Miss Wells.

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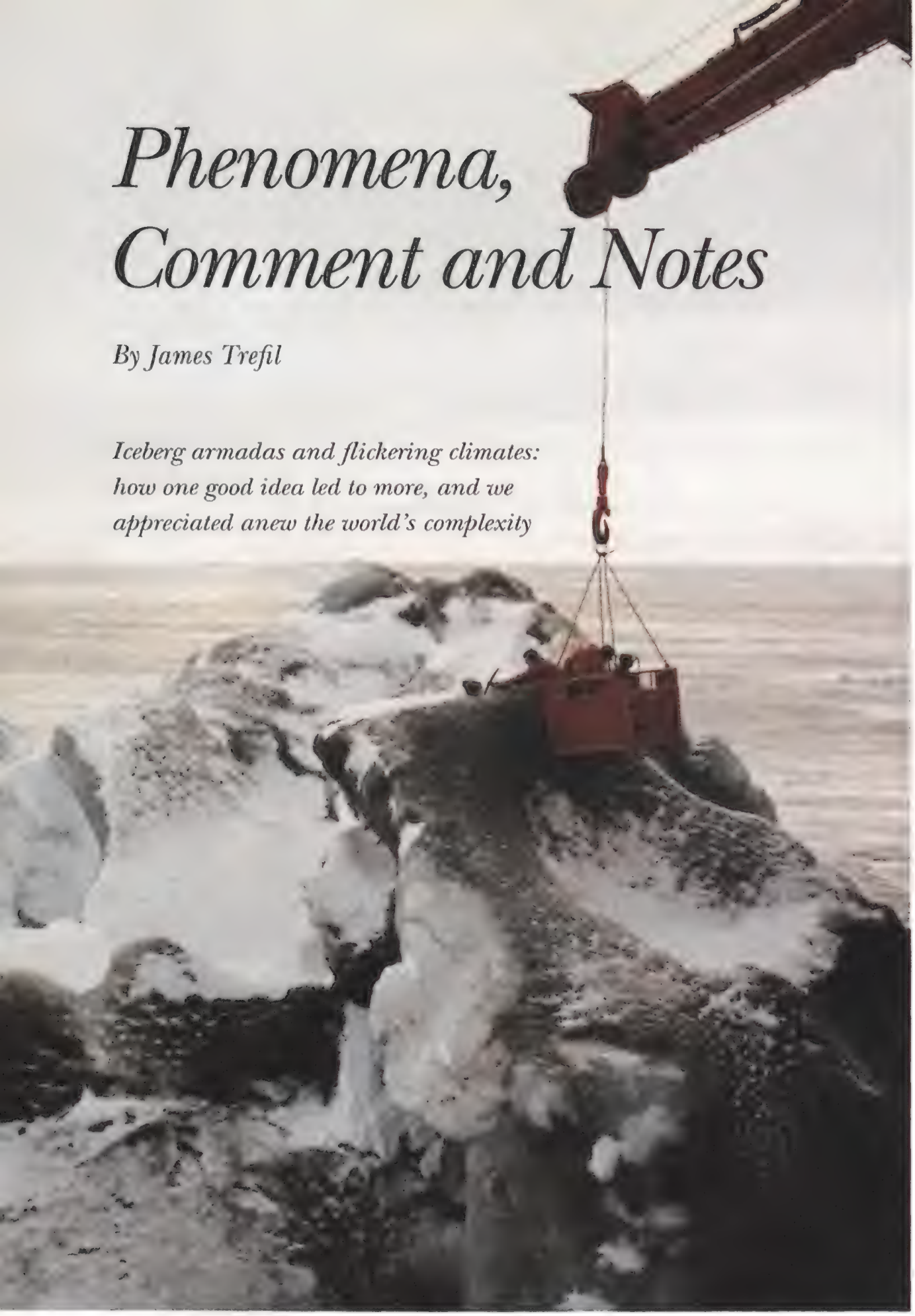
Phenomena, Comment and Notes

By James Trefil

Iceberg armadas and flickering climates: how one good idea led to more, and we appreciated anew the world's complexity



Crane holds a basket of geologists from the German research ship *Polarstern* as they collect rock debris from an iceberg off the Antarctic Peninsula.

There are few things in life more exhilarating than getting a really good idea—one that just sings as it solves a problem that's been bothering you for God knows how long. We've all had this experience. Sometimes the ideas work out, and many illustrious careers have been built on such flashes of insight. Sometimes the ideas are total flops, in which case we bury them and move on.

The sciences are a branch of human endeavor in which ideas are the main item of commerce, the principle coin of the realm. Over the centuries, the scientific community has developed a complex set of rules about how ideas are to be evaluated, as well as some pretty definite criteria that tell you when they can be accepted. So if you want to follow the story of a good idea, what better place to look than science?

As it turns out, readers of this column already have an excellent example at hand. In the August 1993 *Phenomena* you met Douglas MacAyael of the University of Chicago, a young scientist who had just had a good idea about why Earth's climate developed as it did during the last ice age. Doug's idea has since gone through the scientific mill; it's time to go back and see what happened.

To refresh your memory, Doug works in glaciology. Having spent months camping on Antarctic glaciers and years trying to model their flow with computers, he knows about how ice behaves when it piles up. The problem he addressed had to do with a strange phenomenon people had found in cores drilled out of the ocean floor in the North Atlantic. Geologists were amazed to discover successive layers of rock debris and gravel that seemed out of place: the rocks in those layers appear identical to stuff you'd expect to find on land in northern Canada. Other evidence suggested that these layers, which formed every 7,000 to 12,000 years, marked periods of rapid climate change. Average temperatures climbed more than 10 degrees—the equivalent of moving the climate of Atlanta to Boston—in a few decades, followed a few thousand years later by an equally rapid return to normal. These sudden shifts in climate, accompanied by out-of-place rocks being dumped into the North Atlantic, were called "Heinrich events" after the German scientist who first discovered them.

Doug's idea was that you could understand both the origin of the rocks in the ocean bottom cores and the dramatic shift in the weather in terms of the behavior of the ice sheet that covered North America over much of the past 80,000 years. The depth of the sheet would increase as snow fell and compressed into ice, but when the ice lying on top of Hudson Bay reached to a height of about 10,000 feet, the soft rocks underneath would crumble and mix with meltwater, forming a slippery paste, and the whole thing would slough down Hudson Strait and eventually into the ocean, sending out an armada of icebergs, each with a load of crushed rocks frozen into its undersides. When the icebergs melted, the rocks were dumped (hence the strange layers). At the same time, the additional fresh water changed the patterns of ocean currents while the absence of two vertical miles of ice changed wind patterns (hence the change in climate).

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The Wonder of Iron-3

Some of the most beautiful sounds of iron are the chime of wind bells and the melodic bowing of the cello.

The Sound of Iron

By Tomoyuki Kohara

For many, the term "metallic sound" connotes discomfort, disharmony, fear and stress. When we speak of the sound produced by iron, many people think of the harsh noises emanating from ironworks and construction sites.

In suspense and thriller movies, metallic sounds are used very effectively to create an atmosphere of tension and increase the sense of anticipation, making the moviegoers edgy and excited. The hard, shrill sounds produced by iron and other metals are also indispensable elements for conveying the mental stress and discord felt by movie heroes and heroines during tension-packed scenes.

On the other hand, there are also many iron sounds with pleasant associations. Iron is a major element in the music produced by many popular musical instruments.

Pianos, mandolins, violas and steel guitars all use the vibration of steel strings resonating with the instrument to create beautiful sounds. Glockenspiels and steel drums can produce a wide range of sounds. The glockenspiel covers three octaves using steel plate cut to different lengths for each note in the scale. Triangles, cymbals and bells make good use of the metallic sound of steel although they cannot individually form a melody.

The sound of Japanese wind bells can be defined in this way. Apart from the occasional typhoon, Japan experiences only light winds from early summer to the beginning of fall, so to many Japanese, the sound of wind bells elicits memories of cooling summer breezes. According to Japanese aesthetics, the refined, natural sounds of the wind are highly valued, so perhaps this is the reason wind bells sound so pleasant. Unfortunately, for Westerners staying at Japanese country inns, the bells may actually intrude on their peaceful enjoyment of a different Japan.

About the Author:
Tomoyuki Kohara is a science journalist who is interested in the materials of the life sciences, global environment, and ecosystems. He earned a master's degree from Hokkaido University in piscatology.

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"The point of the model," he told me recently, "was that everything depended on the internal behavior of the ice sheet. It was the ice driving Earth's climate, rather than vice versa." In a profession full of people who want to understand Earth's climate, a notion like this can be regarded as anything from a brilliant flash of insight to the rankest heresy. This is where the historic procedures of the scientific community come into play.

With an idea in hand, the first step is to submit a paper to a journal that in turn will vet it by a process known as peer review. The editors send the paper to one or more other scientists who evaluate it. The person submitting the paper is not told who the referees are, but normally they are chosen not just from his or her general field but from the writer's specialty. They advise the journal editor whether the paper is reasonable and worth publishing. Once the paper is published, it is subjected to a wider form of peer review. Any scientist anywhere in the world can submit a paper to the same journal calling attention to perceived inconsistencies, omissions or outright mistakes in the original paper.

In Doug's case, one of the anonymous referees realized that there was a big gap in his theory: he hadn't worked out how the sloughing ice could pick up the rocks and dump them into the ocean. A quick phone call initiated a collaboration that fixed that gap. This sort of criticism is a standard opening shot in any scientific debate, and in Doug's case it was well under way by the time his first paper was published.

The next (and more fundamental) critical step was not slow in starting. Call this the "there is another explanation for the whole thing" response. Often the most vociferous part of scientific debate, it usually consists of arguments between identifiable camps of individuals. Doug's "ice causes climate change" school was one such camp, which was opposed by a "climate change changes the ice" school, whose central idea was that it was global warming that caused the purging of the Hudson Bay ice sheet, rather than the growth of the ice sheet itself. This stage of scientific debate often resembles nothing so much as a trial in open court. It can be rancorous, it can be unsettling, but it is also necessary because, in the end, only those ideas that have been tested

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in this kind of fire can be trusted.

The debate is made more spirited by the very human tendency of the protagonists to believe that their particular theories explain everything there is to explain. "I was like a raccoon caught in the headlights," Doug now says with a rueful grin. "I was so obsessed with the power of the idea of ice sheet dynamics that I wanted it to be the whole picture and not just part of a larger whole. The idea was beautiful, simple and, in the end, wrong."

The "beautiful" and "simple" are understandable. What an easy world it would be if climate had been governed by the rise and fall of a single glacier. To get to the "wrong," though, you have to understand one more crucial weapon in the testing of a new idea: new data. When snow falls and packs down into ice, it carries all sorts of information with it, and that information gets locked into the glacier. The relative abundances of different versions of oxygen (what scientists call the "isotope ratio") in the ice molecules tell us what the temperature was when the snow fell.

What makes this so useful is that each year's snowfall makes an easily identified line in the ice. This means that as we drill down, these lines act like tree rings and allow us to keep track of the year. When two drilling teams (one European and one American) hit the rock 10,000 feet under the surface of the Greenland ice sheet last year, they had cores with records of the past 200,000 years of North Atlantic climate.

And what a story they tell! The Heinrich events are there: every 7,000 to 12,000 years the world had experienced a cold wave—at the same times that rock debris was being dumped on the ocean floor. Immediately thereafter, temperatures would climb to above normal. The higher temperatures would last for several thousand years, and then the climate would return to normal.

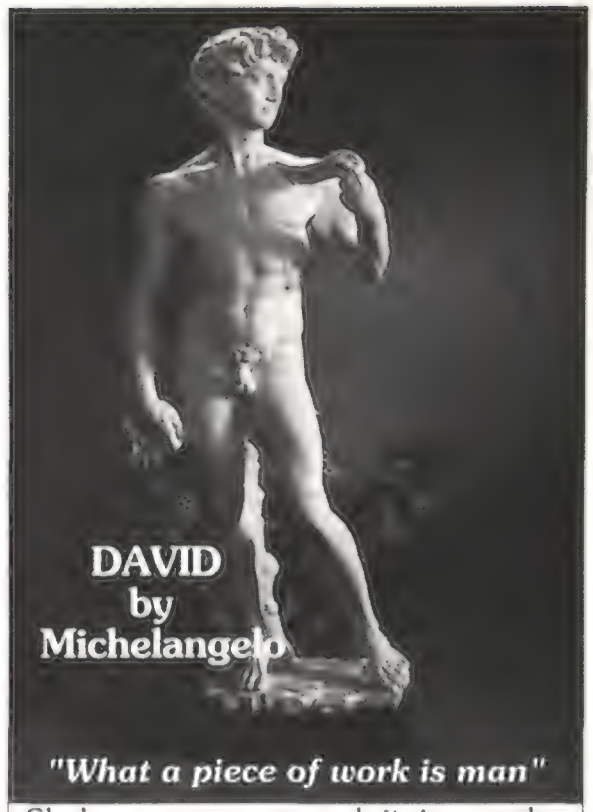
The Greenland ice cores had more to say, however. Between the Heinrich events are a series of shorter cold snaps, which begin and end with temperature changes as rapid as those that mark the Heinrich events. Referred to informally as "flickers," these events start as small drops in temperature, but each succeeding one is colder than the last.

Looking closely at deep-ocean cores, scientists found a second series of sediment layers corresponding to the onset of each flicker. Sand in these layers featured a reddish iron coating that could be traced not to Hudson Bay but rather to the St. Lawrence Valley, which was also covered by ice at the time.

"So now we had two ice sheets going through the buildup-and-purge cycle," says MacAyael. Hudson Bay produced the Heinrich events, and the St. Lawrence caused the flickers. "The Saint [Lawrence] is farther south where the ice sheet got more snow, and so it built up more quickly. This may be why the flickers occur more often than the Heinrich events." (More snow means the St. Lawrence ice sheet reached the critical depth to make a slurry for fast flow more often than its counterpart in Hudson Bay.) So although the addition of a second ice sheet emptying into the Atlantic makes the picture more complicated, it is still consistent with the original grand hypothesis that climate changes are caused by ice dynamics.

More new information, however, changed everything. It turns out that the flickers build up in intensity between Heinrich events, but that the warming after the last (and coldest) flicker seems to coincide with the warming of the Heinrich event itself. The picture, then, is that the St. Lawrence ice sheet built up and purged several times as the ice dome over Hudson Bay was growing, but that when the ice over Hudson Bay let go, the ice over the St. Lawrence did the same. There's no reason why two ice sheets, each with different snowfall and structure, should be synchronized like that if climate depends only on the internal dynamics of the ice.

So the world turns out to be a lot more complicated than any of the different camps in the debate thought it would be. It's not "just the ice" or "just the climate," but some complicated mix of the two that determines what happens on our planet. At this writing, Doug and one of his graduate students, Christina Hulbe, are trying to see whether the effect of the climate might be to create a floating ice shelf off the Canadian coast (similar to the Ross ice shelf in Antarctica) that would, in effect, "put a cork in the bottle" and prevent the glaciers from discharging until the cork popped. Other people have other ideas, and the debate goes on. The effect of the original good idea, then, has been to drive the scientific community to a more realistic, and more complicated, view of the world's climate. Be it ever thus.



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Museum Hours

The American History, Natural History and Air and Space museums are operating on extended hours daily, 10 A.M.- 6:30 P.M., through Labor Day, Monday, September 4. Regular hours, 10 A.M.- 5:30 P.M., will resume September 5. Hours at the National Zoo are 9 A.M.- 4:30 P.M. daily for buildings, and 8 A.M.- 8 P.M. for grounds, through September 15. Other Smithsonian museums are generally open 10 A.M.- 5:30 P.M. daily except December 25.

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Special September Exhibits, Events

Arthur M. Sackler Gallery
Goyō: Japanese Prints (through March 17, 1996) Color woodblock prints by Hashiguchi Goyō (1880-1921). See *Highlights Continued*, page 20.

The Power of the Pen: Islamic Calligraphy in the 14th Century (September 24-May 27, 1996) Exhibit examines the blossoming of Islamic calligraphy.

Freer Gallery of Art
On the River (through January 1, 1996) Hanging scrolls, panels, handscrolls, album leaves and fans illustrate everyday life along a river in China.

National Air and Space Museum
Flights of Fancy: Photographs by Jacques-Henri Lartigue, 1904-1922 (September 30-March 31, 1996) Images capture the early years of aviation.
The Enola Gay (runs indefinitely) Exhibition features the forward fuselage of the *Enola Gay*, the B-29 that dropped the atomic bomb on Hiroshima. For information on free, same-day, timed passes, call (202) 786-2122.

National Museum of Natural History
Ocean Planet (through January 1, 1996) Exhibit looks at the causes and consequences of environmental threats to the world's oceans.
Gem and Mineral Hall Gallery is closed for renovation until December 1996. The famous Hope Diamond is on view on the second floor of the Rotunda.

National Zoological Park
Amazonia Permanent installation re-creates a microcosm of the world's largest rain forest and river habitat.

National Museum of American History
World War II: Sharing Memories (through November 12) Exhibition is designed to elicit visitor participation in commemorating the war—paintings, objects, photographs, memorabilia.
American Encounters Permanent exhibit focuses on the American Indian, Hispanic and Anglo-American cultures of New Mexico's Upper Rio Grande Valley.

National Postal Museum
Maps on Stamps: A Topical Collection (September 15-October 1996) More than 100 U.S. and foreign stamps.
More American Stamps (September 29-September 1996) Display of commemorative and definitive stamps issued in the United States since 1977.

National Museum of African Art
Art from the Forge: (September 6-January 2, 1996) Metal jewelry, ceremonial armor and furnishings made and used by the Tuareg and Moor peoples, who inhabit regions of West and North Africa.

Arts and Industries Building
Equal Rights and Justice (September 22-March 3, 1996) Exhibit presented by the National African American Museum Project features contemporary art inspired by the civil rights movement.
Discovery Theater
Help Yourself! (September 18-29) Live theater for young audiences. For showtimes, ticket prices and reservations, call (202) 357-1500 (voice or TTY).

Hirshhorn Museum & Sculpture Garden
Directions: Martin Kippenberger (through October 22) Collages and satirical drawings by the German mixed-media artist.

National Portrait Gallery
Majestic in His Wrath: The Life of Frederick Douglass (through November 19) Exhibit tells the story of Douglass' life and legacy through paintings, prints, photographs, other memorabilia.

National Museum of American Art
Farm Worker's Altar (through October 15) Altar designed by Emanuel Martínez for a mass celebrating the end of César Chávez's hunger strike protesting the plight of migrant farm workers.

Renwick Gallery
Rick Dillingham: A Retrospective (through January 1, 1996) Works done in artist's unique ceramic style were inspired by archaeology and architectural forms.

Heye Center, National Museum of the American Indian (New York)
Creation's Journey: Masterworks of Native American Identity and Belief (runs indefinitely) First of three inaugural exhibitions features 165 objects dating from 3200 B.C. to the present.

Cooper-Hewitt, National Design Museum (New York)
Gallery Closing The exhibition galleries of the museum are closed for renovation for approximately one year.

Archives of American Art
(1285 Avenue of the Americas, New York)
Recent Gifts to the Archives (through October 6) Sketches, manuscripts, letters.

Smithsonian on the Air

Folk Masters In celebration of Hispanic Heritage Month, Radio Smithsonian presents a one-hour public radio special featuring Israel (Cachao) Lopez, Mambo King of Havana and Miami, and his orchestra. Check local listings.

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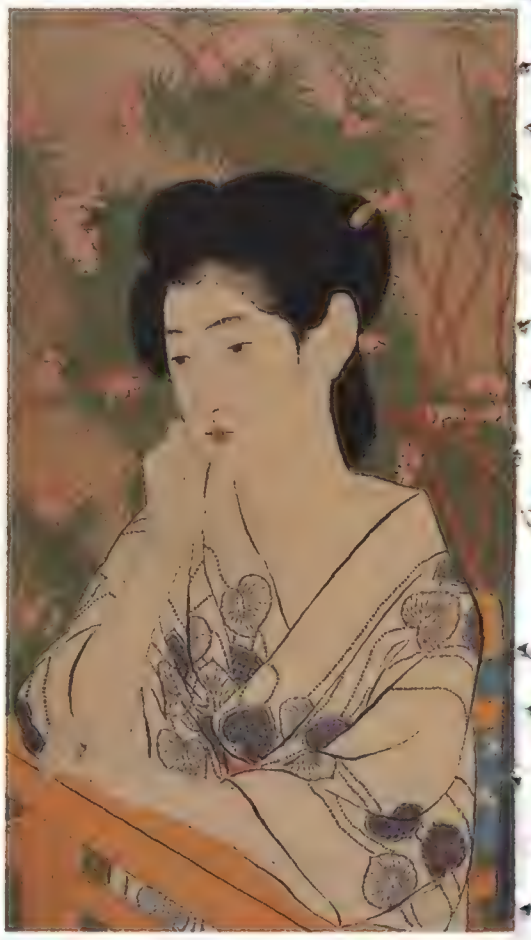
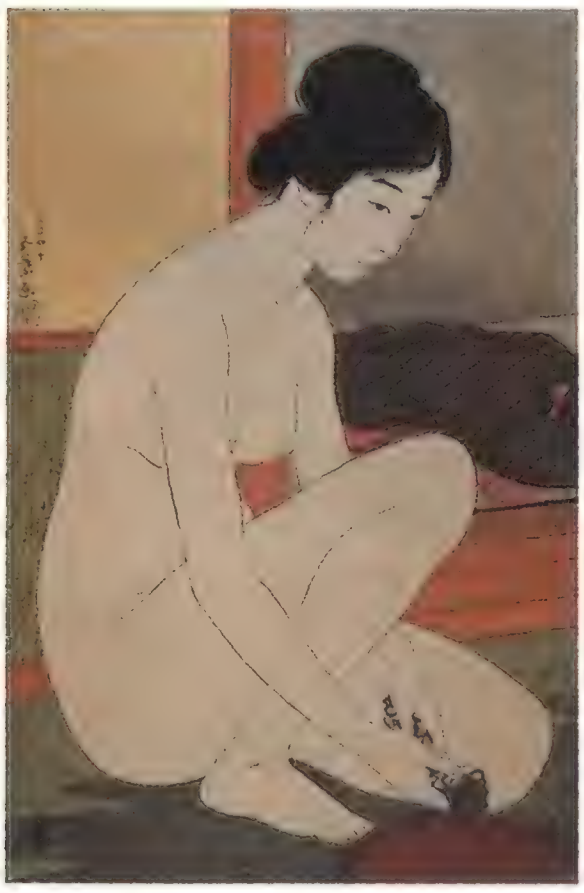
Hashiguchi Goyō's woodblock prints

Japanese artist Hashiguchi Goyō (1880-1921) devoted the final years of his life to creating a series of color woodblock prints of uncommon quality. The grandson of a samurai, Goyō graduated from the Western-painting division of the Tokyo School of Fine Arts and achieved success as both an illustrator and designer before turning to woodblock prints. Known as *ukiyo-e*, or pictures of the floating world, these prints were traditionally produced from the designs of famous artists by a team of specialized artisans supervised by a publisher. After an exhaustive study of the finest Japanese prints, Goyō recognized the limitations of this system. As a result, all but one of his color prints were self-published, with Goyō himself supervising every aspect of design, block carving and printing.

"Goyō: Japanese Prints," on view at the Arthur M. Sackler Gallery through March 17, 1996, features an extraordinary collection of 16 color woodblock prints, representing the artist's lifetime output. "The creative union of Goyō's Western artistic training with the techniques of traditional *ukiyo-e* set a new standard of quality for the modern Japanese print," says exhibition curator Ann Yonemura. "His work had an immediate and lasting impact on Japanese recognition of the individual artist's creative role in the medium."
Diane M. Bolz



A white crescent of unprinted paper represents the moon in *Evening Moon in Kobe*, one of Goyō's few landscapes. Artist was best known for his elegant images of women, such as the richly decorative *Hot Spring Hotel* (right).



Playful rendering of two ducks (1920) is Goyō's only print design of birds, an important subject for 19th-century Japanese artists. *Woman Bathing* (left), from 1915, was the first color print published from a design by Goyō.

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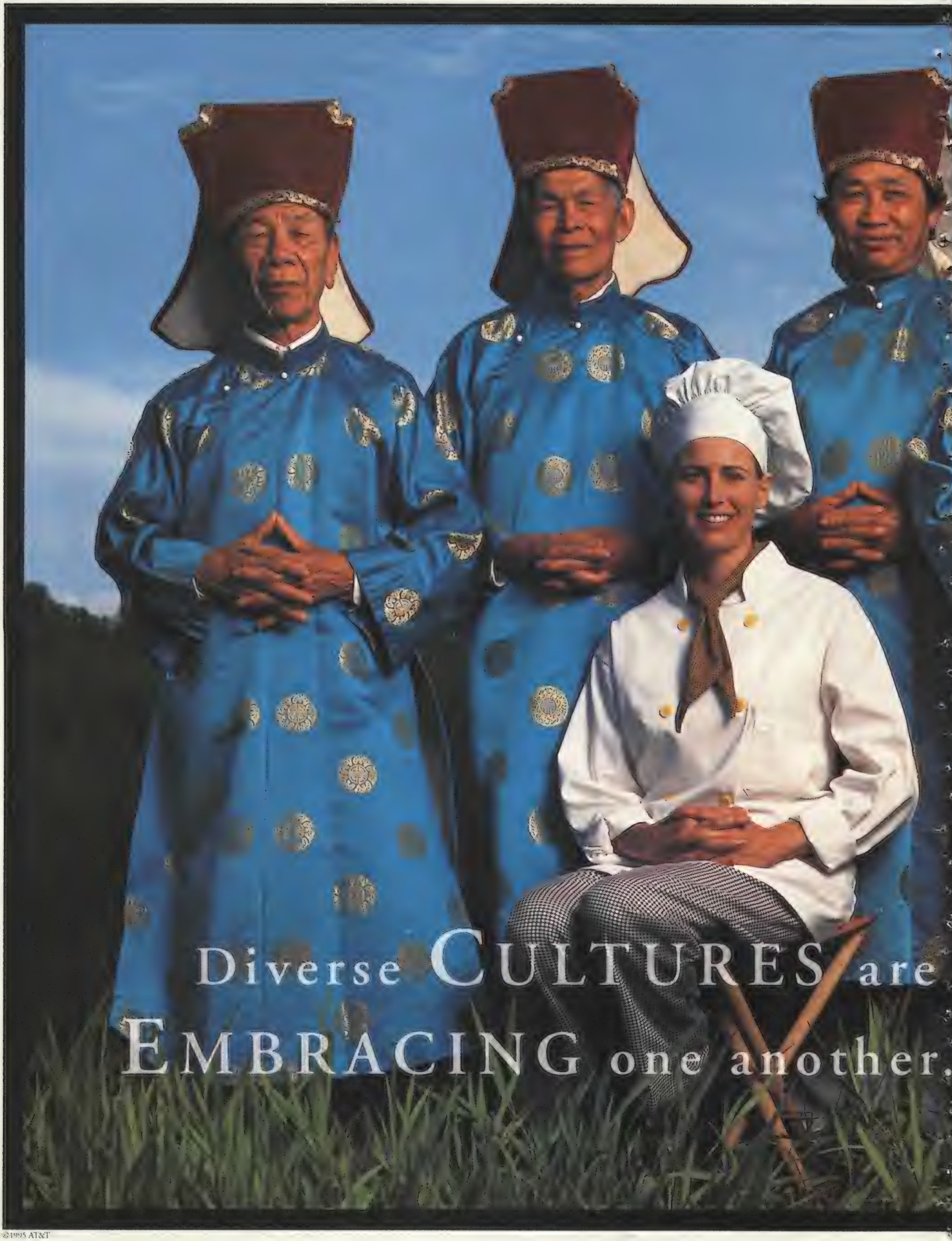

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BUILDING BRIDGES

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AT&T
Your True Choice

By Carl Hoffman

When he saw how well it was preserved, he thought: Why not just fly it out of here?

Actually, there were a lot of reasons, but that didn't prevent Darryl Greenamyer from wrenching an old warplane out of its grave

A B-29 called *Kee Bird* sits mired in a lake bed in Greenland where it belly-flopped 48 years ago.

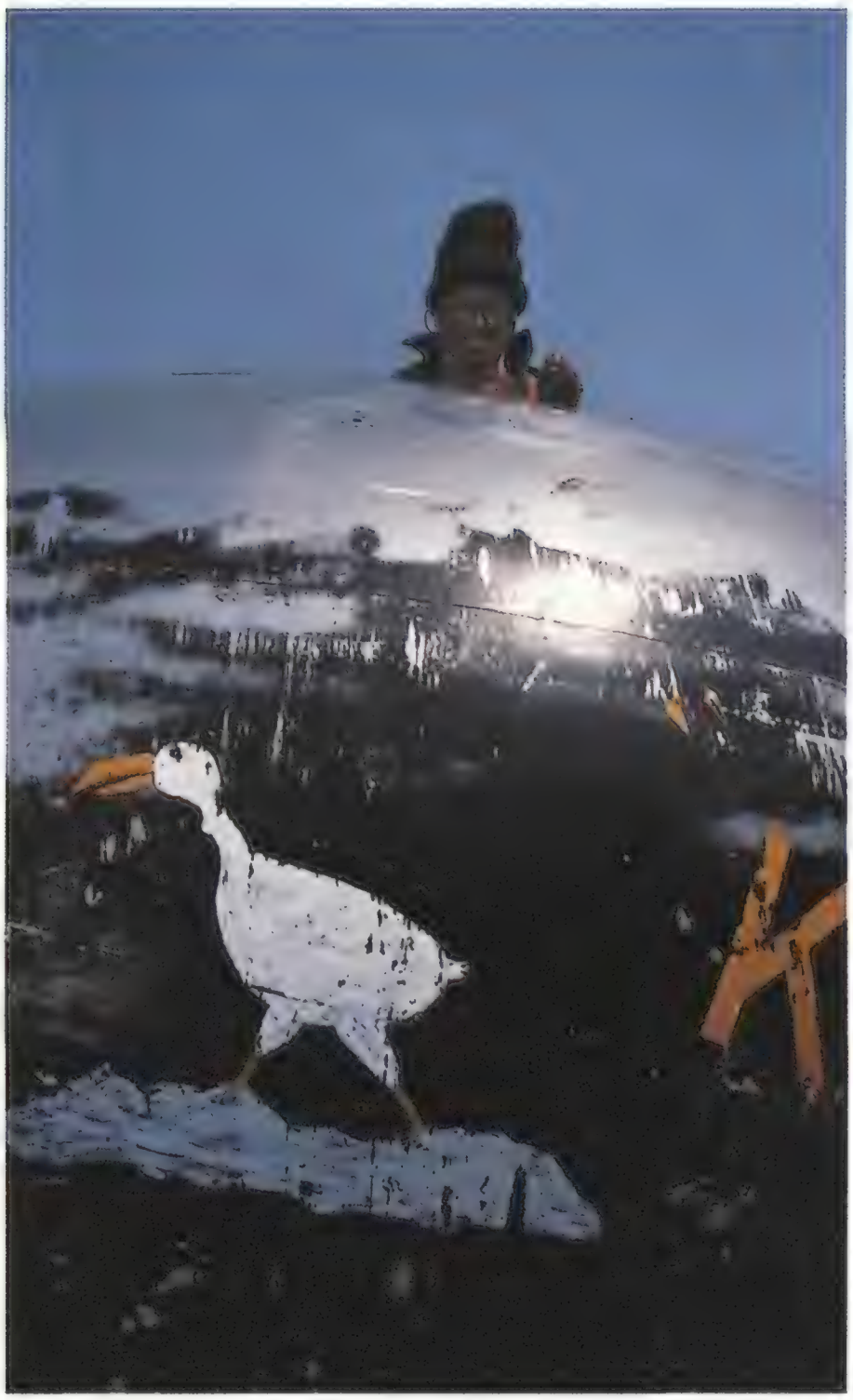
On a desolate plain 950 miles above the Arctic Circle in Greenland, Darryl Greenamyer is preparing to take wing. He knocks the snow from his boots and squeezes into the pilot's seat of the old bomber. Ice sticks to his oil-stained coveralls. "I can't see a thing," he says, gazing at the web of cracks covering nearly every pane of windshield. Gauges are missing. A rat's nest of unconnected wires clogs the floor. Two days ago, 65-mile-an-hour winds drove the windchill down to -50 F. Eight months ago, one of Greenamyer's crew members prayed on his knees in despair, and another was evacuated on a stretcher, to die in a Canadian hospital. But now, against all odds, Greenamyer has got 8,800 horsepower of yesteryear's technology thundering in an awesome crescendo. He has never been in a plane he couldn't fly.

It is his third trip to this harsh wasteland in as many years. Having flown lower and faster than anyone, having extricated "unflyable" aircraft from runways all over the world, he is determined to liberate this 85,000-pound B-29 Superfortress from the frozen lake bed where it was abandoned nearly half a century ago. It had gotten lost on a reconnaissance mission and was running out of fuel when it belly-flopped here. The 11 crewmen were rescued by a 23-year-old lieutenant flying a cargo plane with eight rockets strapped to its wings, and the bomber, named the *Kee Bird*, was left behind. Over the years, thousands of other B-29s that helped win World War II disappeared. The *Kee Bird*, having flown only 220 hours before it went down, was preserved intact by the Arctic cold.

Photographs by Tim Wright

The stirring saga of the Kee Bird

Members of the original crew (top left) waved at a passing plane shortly after their 1947 crash-landing.



Greenamyer peers from cockpit over a rendering on the bomber's nose of its mythical avian namesake.

Denmark and Greenland gave three people permission to recover the plane, but only Darryl Greenamyer had what it took to tackle the job. His talent for flying, however, was offset by his ignorance of the Arctic. The very coldness and remoteness that had protected the *Kee Bird* made it almost impossible to retrieve. A wealthy salvor might try to snatch it off the tundra with a helicopter crane, but the cost would exceed the millions the plane was worth. Saving the vintage bomber without spending a fortune would take an audacious treasure-hunter who was creative, fearless and relentlessly tight-fisted. Meet Darryl Greenamyer.

After growing up in Southern California, Greenamyer joined the Air Force and stayed in just long enough to learn how to fly before signing on at the Lockheed Skunk Works, the supersecret operation that developed everything from the U-2 spy plane to the Stealth bomber. As a civilian employee there, he graduated from both the Air Force test pilot school and the Navy's "top gun" school. In the early 1960s, when he was testing the SR-71 Blackbird, a spy plane, it was nothing for Greenamyer to fly from Lockheed's hangar in Palmdale, California, to Eglin Air Force Base in Florida in less than an hour. He said he just loved "to haul ass." In 1969 he broke the world speed record for piston-engine aircraft. Seven years later, he salvaged an F-104 Starfighter from a Florida scrap yard, towed it home on a trailer, rebuilt it and then flew it a shade under 1,000 mph just 30 feet off the ground, setting a new low-altitude jet speed record.

Icy snow was stained by spilled oil and soot, and scarred where propellers gouged it. Fuselage remained intact.

Except for a few cracks and scratches, B-29's cockpit looks virtually unchanged despite the passage of time.

During the past couple of decades, Greenamyer has specialized in rescuing warbirds. After bidding on planes that have been moldering away on the tarmacs of various national air forces, he flies them back to his hangar in Ramona, California, where they are restored and sold, usually at a profit. By the time he heard about the *Kee Bird*, it had become something of a legend. People were drawn to it. Not long after the crash-landing, a physician from Denmark went off looking for the site with a team of dogs and disappeared. Most American and Canadian fliers newly posted to Arctic air bases were routinely introduced to the *Kee Bird* via a low-altitude pass. After so many years, it still looked to be in nearly perfect condition, and that's what intrigued Greenamyer. What the hell, he thought, why couldn't he just fly it out of there?

A brief 1993 expedition persuaded him it wasn't such a crazy idea. Under what he would later discover to be rare blue Arctic skies, he managed to jack the plane up, lower its landing gear and even get one of its 18-cylinder engines to start. The *Kee Bird* required plenty of work, but Greenamyer was sure a team of six could get it done in several weeks. A couple of years and $500,000 later, his idea has long since become an obsession. "We've got a bear by the tail," he says, "and we just can't let go."

It is May 1995, and he is sitting in the sparsely furnished living room of an overheated barracks at Thule Air Force Base, some 240 miles south of the *Kee Bird*. He is back for his third visit in two years. A slight figure with lively eyes and a merry manner, Greenamyer is surrounded by the members of his latest team. Matt Jackson is squat, barrel-chested and brash. A Reno air racer, he has built some of the world's fastest piston-engine airplanes, including one in which he hopes to establish a new speed record. Vernon Rich, auburn-bearded and a self-described "precision fabricator," has helped build everything from race cars to offshore powerboats to fire-spitting weapons for Hollywood. Texan John Cater has honed his 30-odd years of radial-engine wrenching by repairing and maintaining World War II aircraft around the globe. Flight engineer Thad Dulin, round and slow-talking, is one of the few people under 65 who have actually flown a B-29. Al Hansen is a pilot and vintage warplane restorer whose personal stable of aircraft includes a Russian MiG, two F-104 Starfighters, an F-86, a Hawker Hunter, a Cessna and two helicopters. He is slated to copilot the *Kee Bird*. Returning from last year's harrowing expedition are assistant mechanic Cecilio Grande and cook-mechanic Bob Vanderveen.

The men haven't even gotten to the plane yet, but they are already enmeshed in a logistical nightmare. A chartered De Havilland Twin Otter is supposed to take the first contingent up to the site in the morning, Friday. Seven crates containing everything from tents and sleeping bags to key airplane parts have been waylaid in New Jersey and won't arrive until Tuesday. The weather

Carl Hoffman has written for SMITHSONIAN *on tractor collectors and pinball machines. He made two trips to Greenland to report this story.*

Vernon Rich (above) waits as a new engine is swung into place for installation. Putting a new aileron on the left wing (center) takes many hands. Reattaching the rudder (opposite) is no easy task, either. Torn off by storms, it was found in the lake and repaired on-site.

in the high Arctic can change in moments, making flight and work impossible. At this time of year the sun is shining 24 hours a day, and soon—no one knows exactly when—the icebound lake from which Greenamyer hopes to take off in the *Kee Bird* will thaw. Every day, every *hour*, counts. "I'm not suggesting that we go in without adequate supplies," he is saying, "but I want to get everything done and get out of there as fast and furious as we can. Let's see if we can scrounge some sleeping bags from the Air Force and go in tomorrow anyway."

It's vintage Greenamyer, and Vernon Rich laughs. "The show begins!" he says.

By 4 the next afternoon, Greenamyer, three team members and two charter pilots are stuffed into the ski-equipped Twin Otter like a bunch of clowns in a miniature circus car. They are taking with them several kerosene heaters, a tank of propane and a barrel of jet fuel (for the heaters), toolboxes, a high-frequency radio, boxes of food, and a pile of borrowed tents and sleeping bags. What the men will find when they arrive at the plane site two hours later is a mystery. Nobody has seen the *Kee Bird* since the previous summer. The Thule weather forecaster says the temperature at the site is around 5 degrees. No one knows how much snow is there. No one knows if the fabric-covered ailerons and rudder installed last year have survived winter winds that can reach 200 miles an hour. No one knows if the bulldozer, generator and aircraft heater left behind up there will start, or if the old canvas mess tent, already badly torn, can be resurrected. But at least this time they aren't flying in the Caribou.

During his second visit, Greenamyer used one of his salvage jobs, a 1962 De Havilland Caribou, as his lifeline between Thule and the site. A journalist who rendezvoused with him at Thule that summer took one look at the tattered relic and nearly panicked. Greenamyer had just flown it in from the *Kee Bird* with two members of that year's crew, Roger von Grote and Cecilio Grande. They were wrestling a 3,500-pound engine into the Caribou's belly, which was already crammed with other material. The "boys" (that's what everyone called them) were a sight. Matted hair, grease-stained clothes, messy beards, muddy boots—it was scary.

But nothing was as scary as the Caribou. The expedition needed a shuttle plane that was tough and versatile. It had to have enough range to fly to the site and back without refueling. It had to be able to carry a huge load. And it had to be able to land and take off from soft dirt or light snow on a runway less than 1,500 feet long. The Caribou supposedly could do all of those things, but for how long was by no means clear.

"Where's the checklist?" von Grote, a 62-year-old former test pilot would ask.

Greenamyer would tell him to forget it.

"We're overloaded!" von Grote would warn.

Greenamyer would throw on some more stuff.

Greenamyer is not a blusterer, but he is single-minded and pushes to the limit. Are the Caribou's props still turning? Have the wings fallen off? OK, no problem. Never mind that the plane was leaking oil. Never mind that its deicing system wasn't working—neither were its fire-warning system and many of its gauges.

There was trouble on the Caribou's first flight in. The front tires came off the rims when they touched down in the mushy tundra. Where in the world would the crew find the inert gas needed to refill them? Lead mechanic Rick Kriege had a brainstorm. The propane stove! The boys filled the tires with highly explosive propane gas, and soon they were as good as new.

When the Caribou flew in the bulldozer, it was 5,000 pounds over its load limit. Naturally, that's when the flaps failed. The plane hit down so hard that the front tire smashed 18 inches into the mud. "Every landing is on the critical edge," said von Grote. "It's the most exciting flying I've ever done." That from a man who once allowed himself to be launched from the bed of a truck in an F-104 with a rocket strapped to its belly.

The *Kee Bird* crashed just 30 miles from the coast in a broad valley as brown and featureless as Mars. The eight tents at the site were surrounded by mechanical debris from the B-29. The names "Pat," "Polly," "Ida" and "Norma" were still painted in yellow on the engines of the shiny silver bomber. Still emblazoned vividly across the nose was a comic rendering of the "Kee Bird," a mythical Arctic creature that was said to dance around in the snow complaining, "Kee-kee-rist, it's c-cold."

One of the crew members likened the *Kee Bird,* "airplane-wise," to Tut's tomb. Inside, and strewn all over the ground, were souvenirs of another time and another war. Old sleeping bags and winter coats lay in a jumble alongside unused flares, hundreds of cans of K-rations, even packs of still-edible Charms candy.

The analogy ended there. The *Kee Bird* may have been an ancient warplane, but it was nevertheless a very complicated one and a lot had to be done before Greenamyer could try to get it in the air. The boys had to install four newly rebuilt engines—a huge job. There was a long list of other "new" components that had to be put on: hoses and propellers; ailerons, elevators, a new rudder and cables to control them. The tires had to be changed, another big job, and the wheel bearings needed to be replaced. It had taken Greenamyer months of serious scrounging to locate many of the parts. He found one of the props hanging on the wall of a friend's living room; he found a pair of bomb-bay doors sheltering a picnic table in an Arizona park.

The workload was staggering, 15 hours a day every day, often in 35-degree temperatures with a freezing

rain. Generators and compressors roared hour after hour. The tires weighed 600 pounds each, and it took three people six hours to change just one of them. Rick Kriege labored nonstop. Years earlier he had lost a finger and crushed an ankle while working as a roughneck on an oil rig out West. He had a knack for problem-solving that his colleagues considered nothing short of genius. "Innovate, you've got to innovate!" he would holler whenever something wouldn't work.

Clearly Greenamyer and the boys were driven by something besides money: a thirst for adventure, a love of machines, a need for challenges. "We may not be the very best mechanics in the world," Vernon Rich confessed one day, stirring his coffee with his Buck knife. "But *I* don't know where those people are. Too many people told us, 'No, you can't do it,' but we're here and they're not."

Bad weather and exasperating mechanical complications dragged on week after week. Finally, though, the weather started improving and the *Kee Bird*'s likely takeoff seemed only a couple of more weeks away. On Greenamyer's 58th birthday, work stopped early and a party began. While the crew hunkered down around a heap of beer, scotch and tequila bottles, Greenamyer recalled the time he flamed out in his record-breaking F-104 over the Mojave Desert. "When the ejection seat fired, I thought the plane had blown up. They say you black out, but I was counting the rivets as I flew out. I nearly hit three saguaro cactuses coming down." Instead of lighting candles on a cake, the men pulled the pins on two flares dated 1942 and watched with delight as balls of orange sparks shot into the clear air.

After that the weather closed in again. Incessant rain turned the ground to mud and dampened the crew's spirits. Kriege began to look exhausted, often sitting with his head in his hands. The tops of the nearby hills became covered with snow. "We've got another week, and then I think it will get dangerous," said von Grote. "We won't be able to get the Caribou out."

Finally Greenamyer clambered into the *Kee Bird*'s cockpit and fired up an engine. There was a high-pitched whine, a belch of thick black smoke and then a great explosion as the engine thundered to life. Dust and debris flew behind the violently quivering bomber. Kriege smiled ear to ear for the first time in days. Grande danced in the Arctic sunrise, his greasy hands held high. Rich hooted like some rodeo cowboy.

The celebration was, it turned out, premature. Kriege, who was seriously ill, collapsed, pale and unable to climb out of his sleeping bag. Flying in with its last load of fuel for the B-29, the Caribou broke an engine cylinder. A replacement cylinder was flown in from Thule, but even as Rich struggled to repair the Caribou two storms struck, back to back. Snow blew and drifted for 14 hours; the wind bounced empty 55-gallon oil drums across the tundra.

As soon as the weather broke, the boys deiced the Caribou with a broomstick and cleared the runway with the bulldozer. Airborne at last, they were 125 miles out of Thule when the right engine blew. As the plane plummeted, Grande fell to his knees and prayed. Rich got ready to eject Kriege's 1,000-pound toolbox and other

Matt Jackson directs as the *Kee Bird* moves under its own power for the first time since it crashed.

gear, but somehow von Grote was able to maintain altitude long enough to reach Thule. Kriege was airlifted to a hospital in Canada, where he died after surgery.

Now it's nine months later and Greenamyer, together with his companions, is bouncing and sliding to a stop at the site in the Twin Otter. There's nothing but snow in every direction, save the gleaming bomber. In the drifts beneath the *Kee Bird*, the men find the aircraft heater, which they use to thaw the bulldozer, which they use to dig out the generator and the mess tent. Within days the rest of the crew arrives, and the camp is up and running at full speed once again.

When the skies are clear and the wind is calm, work speeds along. When the wind blows, the boys curse, warming their hands in the generator's noxious exhaust. One morning, right after breakfast, the wind starts howling as if some huge fan has just been turned on. Blowing snow cuts visibility to 100 feet. Everyone save Jackson, whose tent holds firm, takes refuge in the bomber. "I *hate* camping!" Jackson raves as the winds violently shake his tent. When stillness returns hours later, two tents are gone, and the mess tent is collapsed.

The work continues apace. In temperatures hovering near 20 degrees, the prop controls are wired, the brakes are bled, a runway is plowed on the frozen lake. Over barely thawed canned beef stew, the talk suddenly turns optimistic. "We'll pull out with maximum power, and I'll just make a big sweeping turn and head out to the lake," Greenamyer says, stamping his feet to keep warm.

"Yeah, that'll be a hell of a sight, seeing this thing hurtling down the snow," says Jackson. "But we'd better clean that cockpit out because when you launch, it'll be wild. I'll be yelling, 'Hang in there boys!'"

A week after arriving, Greenamyer is back in the cockpit, cranking up an engine. The prop spins; once again, thick, black smoke belches from the exhaust, and the engine roars to life. This time, instead of last summer's elation there is simply quiet satisfaction. "If we get one running, we'll get them all," Cecilio Grande says. And they do, but not without a struggle. Every engine, it turns out, suffers from liquid-lock, a common problem in older planes. Oil leaks past the piston rings into the cylinder, where it has to be located and drained. Some engines, when throttled, burst a hose, sending fuel or oil spewing. Tempers flare. "Black blood!" yells John Cater, as his ungloved hand, covered with cold oil, locates a locked cylinder.

"Goddammit," Jackson mutters when yet another fuel leak is sprung, "we sure are asking a lot."

On the morning of May 21 it is still and cloudless—almost warm in the intense glare of the sunlight reflecting off the snow. "Today's the day," Greenamyer says. A mood of confidence permeates the camp; the boys seem to move about slowly, as if the urgency that has so long fueled them is gone. By early afternoon the team has all four engines running smoothly, shaking the valley with their insistent drumming. The bomber is alive for the first time in 48 years. "She wants to fly," says Thad Dulin, bouncing excitedly in the flight engineer's seat. "If we can get out of this poop," says Al Hansen, pointing at the snow and ice frozen around the *Kee Bird*'s wheels, "we'll get off the ground."

As the valiant old plane goes up in smoke (opposite), copilot Al Hansen (above left) and Greenamyer watch in disbelief, as a dejected Matt Jackson turns away.

With a tremendous roar, Greenamyer throttles up. Snow flies. Faster and faster the props turn, louder and louder the engines roar, generating a great, unholy, piercing whine. The *Kee Bird* is shaking. It moves an inch. Another inch. Suddenly it pops free of its icy resting place, and Greenamyer, his dream at long last coming true, taxies across the snow, the *Kee Bird* bouncing violently, the sun glinting off the fuselage. "Go Darryl, go!" screams Jackson, jumping up and down. "Forty-eight years, guys!"

Followed by huge rooster tails of snow, the *Kee Bird* thunders to the end of the lake, turns and straightens out. It has almost reached flying speed when, all at once, smoke starts pouring out of the cockpit window.

Smoke?

While Jackson, Grande and the rest of the engine crew look on with open-mouthed astonishment, Bob Vanderveen, stationed in the back of the plane, tumbles out the bomb-bay doors. Then Hansen, Dulin and Greenamyer jump from the cockpit hatch. Flames shoot out of the tail, and Greenamyer, shouting for a fire extinguisher, futilely beats at them with his coat. A moment later the tail falls off, along with part of the fuselage.

No one says anything. Each crew member seems to be isolated within his own world as he observes the appalling spectacle unfolding out on the ice. The eerie silence continues, unbroken except for the cracking metal and popping glass. Soon the entire fuselage is ablaze, thick gray smoke pouring into the sky. It burns for hours while Greenamyer and the boys watch.

The cause of the fire is unclear—something to do with fuel spillage. No one knows for sure.

So much effort. So much time. The idea of seeing that lovely old plane finally take wing was the one thing that had kept everyone going through hardship, fatigue and recurrent bouts of despair. Nine months earlier, when weather and the Caribou had started deteriorating, the boys had joked about who would get eaten first if they ended up stranded and without food. Rick Kriege never did make it home to see his 11-year-old daughter again.

In a world where it often seems technology is replacing God, Greenamyer's tiny team of tool users, plopped down there in the middle of nowhere, had been wrenching themselves out of the existential void. For a moment, with the *Kee Bird* poised to soar, it had seemed that there was nothing they couldn't do, nothing they couldn't fix with a bit of wire or a piece of duct tape. Then, an instant later, the boys were stunned and helpless. "Maybe," one of them muttered at one point after the tail fell off, "we could find a new tail someplace."

There is nothing to do, though, except stand by as the flames consume what is left of the plane.

"It would have flown," Greenamyer eventually says in a quiet, tired voice. "I had elevator control. I got the nose up. It would have flown. What a horrible waste."

At last the boys start milling about. Cecilio Grande gathers up whatever can be burned and starts a fire. Those who are going on the first flight out the next morning start packing.

A week later, after replacing the Caribou's right engine, Greenamyer, John Cater and Vernon Rich fly it home from Thule, where it has been parked for the duration. At fueling stops along the way, people rush up to meet them, having heard about the fiasco over the world's radio fenceposts. Everyone wants a handshake or a snapshot. The men had been braced for the worst; they expected people to pick them apart because they failed. Instead, they're greeted like heroes.

He's proud that he was there

"I think those folks understood and admired the challenge," Vernon Rich reflects when it is all over. "I think they were so jazzed by what we were trying to do that they felt the same sense of loss we felt. It was like we'd all gone in for the lottery, and if we'd won, everyone would have won." He pauses. "I've got a picture on my wall of me and Rick Kriege in front of the *Kee Bird*, and I'm not going to take it down. I'm proud that I was there."

Greenamyer? At home in California, he continues to balk at the idea that he and the boys failed. "I can't believe it really happened," he says. "I have this feeling that I'm going to wake up someday and realize that there's still something else that needs to be done up there—and that we'll go back and do it."

By Helen Dudar

Making a dent in the trafficking of stolen art

From their modest Manhattan digs, Constance Lowenthal and her staff do their best to foil the criminals who swipe treasures for a living

As director of the International Foundation for Art Research, Constance Lowenthal is always on the lookout.

In the shadowy world of modern thievery, the cachet in loot—the next best thing to money—may be art. Crooks who couldn't explain the difference between Manet and Monet have discovered painted canvas. The burglars of Eastern Europe are emptying little churches of beloved holy statues, and archaeological treasures are vanishing from the sites of old civilizations.

Anyone who wants details on the worst of these depredations need only ask Constance Lowenthal, who spends her days and sometimes her nights laboring on behalf of the victims. Lowenthal is executive director of the International Foundation for Art Research, known to cops and collectors far and wide as IFAR. Together with its partner in crimefighting, the Art Loss Register in Great Britain, IFAR maintains an invaluable repository of data on missing goods ranging from masterworks to mind-boggling kitsch. Their computers, which house a clever program for storing and finding images of stolen valuables, now show more than 60,000 items carried away from homes and museums and other sites around the world in recent years. Lowenthal's memory may not match the database, but she's better at details.

When a visitor to the IFAR office in New York City wonders whether this age of hot prices for artworks has actually encouraged the growth of specialty thieves, the inquiry at once summons up a pair of bandits memorialized as the "Social Register burglars." Some years ago, Lowenthal relates, the two had the bad luck to suffer a flat tire while crossing the Whitestone Bridge, which connects the Bronx and Queens. A police officer nosing around noticed that the back of their station wagon was laden with silverware; much of it was old and fine, and all of it, it turned out, was stolen. Then he found a copy of the Social Register with names efficiently checked off: members of the "old family" rich whose homes had been looted of art and other salable valuables.

Eventually the two confessed that a highly respected Boston art dealer was their tutor and the receiver of their stolen goods. He had given them useful art lessons: they were not to steal portraits "because people recognize faces"; they were not to be tempted by marine paintings if the boats displayed the American flag "because people remember them better"; they were encouraged to scoop up landscapes—a vista with trees, a house, a quiet brook, perhaps a cow—the kind of undemanding 19th-century scene that householders with small experience of art feel safe hanging over the mantelpiece. Although the Social Register crooks wound up with jail terms, the authorities never nailed the dealer.

We tend to remember the great works that have fallen victim to thievery, but Lowenthal observes that those

Three missing masterpieces: at top, *The Crucifixion of Christ* by Pieter Lastman, Rembrandt's teacher, was stolen from an Amsterdam museum last year. Below, Rembrandt's *The Storm on the Sea of Galilee* (left) and Vermeer's *The Concert* (right) were among works taken in the infamous 1990 heist at Boston's Gardner Museum.

docile landscapes are actually more typical of what is taken. Ninety percent of looted art is never recovered because "90 percent of what is stolen is not great art. It's inventory. It's not distinctive," she says. An unmemorable piece is, by definition, not easily spotted.

Lowenthal is not a certified sleuth; an art historian who taught for three years at Sarah Lawrence College, she is, in truth, entitled to embellish her name with "doctor." She then spent seven years lecturing visitors to the Metropolitan Museum of Art on myriad subjects from the pyramids to Picasso. As an émigré from the ivory tower, she moves comfortably between artspeak and street talk, and will explain, with engaging brevity, that the mission of the enterprise she now oversees is to answer two crucial questions about a work of art: Is it hot (as in stolen)? Is it right (as in not forged)?

For 25 years these issues have occupied IFAR, a modestly funded, nonprofit enterprise. Lowenthal took up the reins in 1985 at a time when spiraling auction prices had alerted the world's thieving classes to the market for painted canvas, carved stone and other precious goods. Art theft has flourished as never before. Just keeping up with the number of stolen objects and their total value is a big-time guessing game. Pick a number. Two billion dollars a year? Six billion? It's all guesswork. IFAR, its computer linked with the Art Loss Register in London, keeps track of as much of it as possible and often plays a role in recovering a purloined picture.

Consider the case that began with a call from an FBI agent in Miami a few years back. Did IFAR know an artist called "Rubin" and a missing painting titled *Dawn*? A somewhat untrustworthy informant was passing word on the street that this "rare" work was on the market for $3.5 million. The IFAR computer system is designed to deal with just that sort of vague inquiry. Might the name be "Rubens," as in Peter Paul Rubens? Sure, it could be. The computer files, which display "wanted" works in postage-stamp-size "imagettes," showed a stolen Rubens oil sketch titled *Aurora*, a fancier word for "dawn." The painting, along with another Rubens oil sketch, had been taken from the municipal museum of the Spanish town of La Coruña. The case was a good example of how global the market in stolen art can be. The other sketch had already been retrieved—in Stockholm.

A week after the FBI call, a similar inquiry came from the Miami Customs office. On getting the news, Customs decided to set up a sting operation with make-believe buyers. But they needed an expert who could identify the piece with reasonable certainty. This is an area where IFAR is invaluable to law-enforcement agencies, most of which don't count expertise in art among their talents. The foundation staff and its files are a trove of information on every kind of authority in both the fine and decorative arts. With IFAR's help, Customs located a Rubens scholar in New York, Charles Scribner III, who knew the painting and was happy to journey to Florida.

Cops and robbers: at left, a suspected art thief is led handcuffed into court in Israel earlier this year; above, a Belgian policeman discusses the recovery of Picasso's *Woman with Black Eyes*, missing for a year.

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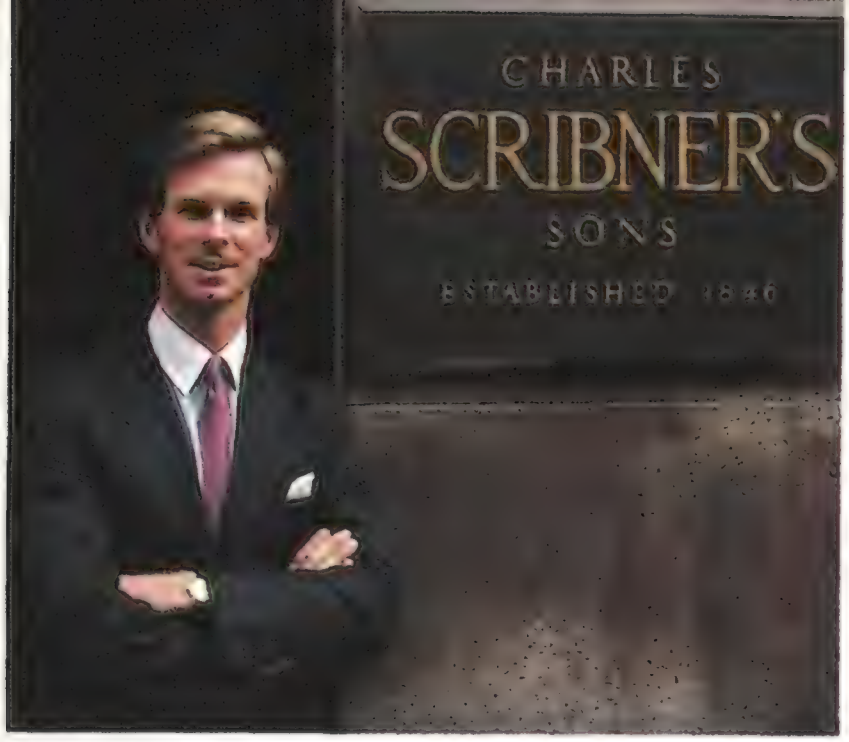

Art historian Charles Scribner III helped out in a Miami Beach sting operation; his role was to verify that the work at right was indeed Rubens' *Aurora.*

There, in a Miami Beach hotel lobby, he identified it and then walked out—a signal to the agents waiting outside. Within a minute of his departure, Customs agents had the thieves in handcuffs.

As often happens, they were not the actual thieves. A stolen piece may pass through the hands of a half-dozen buyers, rising in price as it moves along a chain from flea market peddler, to "junktique" shopkeeper with an occasional good piece among the trash, to high-visibility dealer, until it finally reaches a collector. The buyer may or may not realize he is dealing in hot goods. The sellers of the Rubens, an internationally diverse group that included an Israeli-Mexican, two Nicaraguans and an American, knew exactly what they had. Three of them went to jail on the testimony of a fourth, and the museum got its picture back.

On her best days, Connie Lowenthal's trained eye may zero in on a wanted item without the help of the computer. One afternoon last April, she was nibbling on a lunchtime buttered bagel while leafing through the catalog of an upcoming sale of high-priced jewelry at Christie's in New York. The major auction houses now routinely submit their catalogs for inspection because stolen art, antiques and other valuables can wind up at sales. In this case, Lowenthal cheerfully admits that she was drawn to the display of exquisite jewelry more out of personal lust than official duty.

Turning the pages, she got to Lot 525 and screamed. There in glowing colors was a photograph of a Lalique bracelet stolen four years before, a piece lent by a Madison Avenue dealer in antique jewelry for a special exhibition at the Steuben glass shop on Fifth Avenue. It was lifted while the show was being assembled, and only a half-year earlier Lowenthal had displayed its picture during a TV appearance on the *Oprah Winfrey Show.*

Now, this was no ordinary bangle for the fine wrist of a lady rich enough to afford the sale price estimates of $30,000 to $40,000. It was a rare object, one of only several similar pieces created around 1898 by the Art Nouveau master of glass, René Lalique. It had small, old mine-cut diamonds and larger citrines, but the valuable "stones" were actually molded glass, five large russet-colored hexagons. The Christie's estimate bespoke inexperience. An insurance company had paid the owner $450,000 for its loss and was offering a $50,000 reward, which Lowenthal, on notifying the interested parties, hoped to collect for IFAR and the Art Loss Register.

The story has only a semi-happy ending. The piece had been somewhat damaged; moreover, instead of waiting for an auction concentrated on Art Nouveau objects that might have yielded a better price, the insurers and the seller decided to leave it in the April sale. It went for $85,000, of which 10 percent will probably be the IFAR reward.

The thief may never be found. The seller probably did not know the bracelet was stolen, and it is even possible that the person who sold it to him was equally ignorant. But the five-year statute of limitations for prosecuting a theft has not expired, and Lowenthal hopes the police

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A 40-pound Tang dynasty horse was stolen when an agile Manhattan thief spotted it in a second-story window.

will try to track down the thief by tracing the bracelet's chain of sellers and buyers.

Unfortunately, tracking stolen art is seldom a priority. This is not to say that the law lacks enthusiasm for the effort, but the days are full of more urgent demands—violent crimes requiring swifter attention than a stolen bracelet or even a missing rare painting. Anna J. Kisluk, who runs IFAR's stolen art database, had an apt demonstration of this when she was on the telephone, discussing details of a recent theft with a detective outside the city. Before they could finish, he cut short their conversation. "I'm sorry, I've got to put this aside," he said. "I've got a kidnapping."

Nobody at IFAR likes to think of what happens to the 90 percent of stolen art that is never found. Some of it may be damaged beyond repair or stored away in a cellar, subject to the depredations of dampness. On rare occasions, some of it may be stolen on order. A dozen years ago, three thieves accused of having taken a Raphael and a Correggio from a Budapest museum helped the police recover the works and explained that "a Greek olive-oil tycoon" had ordered the pieces. The Hungarian authorities never could prove it.

Sad to report, Lowenthal will not entertain the fantasy that somewhere in the world is a real-life counterpart of Dr. No, the demonic master criminal of a James Bond film who displayed a major stolen artwork in his lair. She has heard all the theories—or fancies—about big-money receivers of stolen art and believes none of them. "An Arab oil sheik, a money-laundering drug lord, a Pacific Rim electronics magnate. We all know the profile, but it's from the movies," she says.

Most thefts appear to be the work of thieves without serious art education. Along with the good stuff, they are apt to sweep up junk—those sappy gift-shop paintings of kids with enormous eyes, for example, which no serious collector would covet. Some thieves have turned out to be professionals who, following fashion, switched from robbing video stores to burgling art. Some are actually specialists in vehicle thievery; they make off with a truck and then discover that the freight includes some salable pictures. A few are insiders with easy access: doormen, night watchmen, butlers, occasionally even a curator satisfying a longing to own art he or she can't afford.

Among the rare thieves who steal for love was a young man branded the "scourge of Soho" by his victims. He regularly made off with substantial pieces of modern sculpture that he managed to carry out of galleries in Manhattan's downtown art district. In his little Volkswagen, he drove each treasure across the Hudson to his loft in Hoboken, New Jersey. There the police eventually caught up with him and the loot, lovingly installed on pedestals and expertly lit.

Not unexpectedly, an art thief may turn out to be shrewdly ingenious. One Manhattan insider substituted a copy of a Picasso portrait of his mistress Dora Maar for the genuine article on the assumption that the elderly owner would never notice. Someone noticed, and the authentic painting was retrieved.

In another Manhattan case, an outsider simply seized the moment to grab a piece its owner never considered to be portable. The first 1995 issue of *IFARreports*, the foundation's newsletter about thefts and recoveries, displayed a photograph of a magnificent Tang period earthenware horse at least a thousand years old. Given its size and heft—it weighed 40 pounds and was more than two feet tall—its owner probably thought it was at no risk perched on a table in front of a second-floor window. One morning, an agile thief climbed to the window, broke it and hurried off with a Chinese treasure worth a million dollars (above).

IFARreports also provides news of recoveries, but it is the vanished pieces that use up the most ink and paper. One month we learn that a Vlaminck, a Klee and a Dufy are gone, and a New Yorker's collection of elegant Art Deco boxes has vanished. Another time we are asked to be on the lookout for 18 rare pieces of Fabergé taken from a collector in Newberg, Oregon. In every issue we

Helen Dudar wrote most recently about the making of the film Jefferson in Paris *(March) and the "Origins of Impressionism" show (November 1994).*

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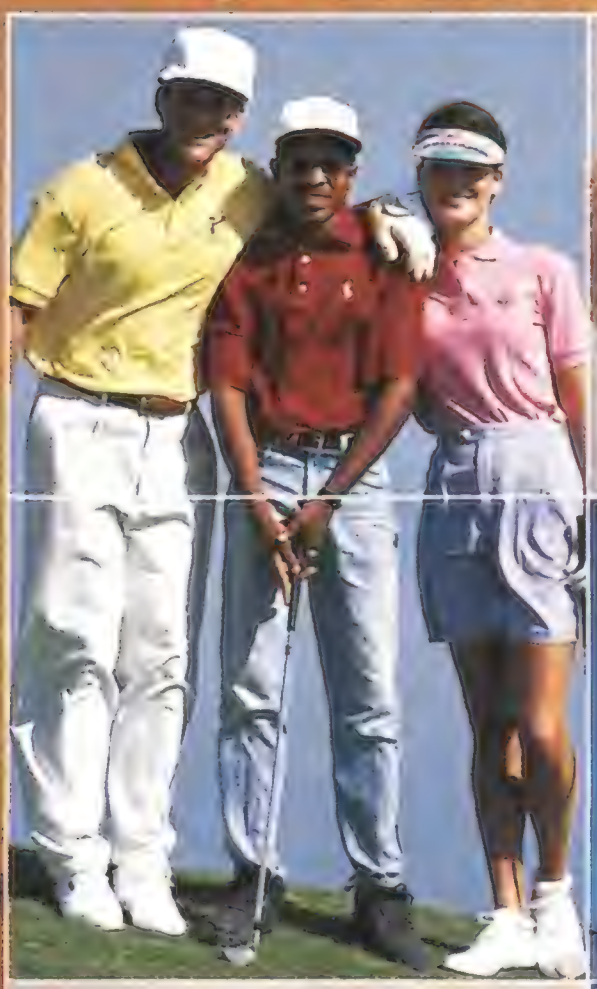

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see some surprisingly mediocre paintings, but somebody loved them and has paid IFAR a fee to announce they are wanted back. It is a rare *IFARreports* without several missing Picassos. At least once a year, a stained-glass Tiffany window is ruthlessly sliced out of a mausoleum wall on an old burial ground. Antique clocks are always in peril. Religious statues and ceremonial objects are vanishing at an appalling rate from unguarded churches in former Iron Curtain countries.

The grand theft of the decade, the one every art lover surely remembers and mourns, is the still-unsolved 1990 nighttime invasion of the Isabella Stewart Gardner Museum in Boston by a couple of thieves dressed in police uniforms. They tied up the security guards and stripped the walls of a rare Vermeer, Rembrandt's only known seascape and 11 other treasures, a haul worth at least $200 million (p. 34). The same year, in a theft nearly as spectacular but less publicized, a band of thieves broke into the Archaeological Museum of Ancient Corinth and made off with the entire contents—271 pieces. These were both sculptures and fine pottery that had been laboriously excavated over a period of 90 years by generations of students and faculty of the American School of Classical Studies at Athens.

The name that dominates IFAR's files is Pablo Picasso. There are 283 entries of stolen works of that modern master, followed by 243 for Joan Miró and 210 for Marc Chagall. These figures do not so much demonstrate criminal tastes as the impressive productivity of the makers. Most of the missing pieces are high-priced signed prints, etchings and lithographs; in long, prolific lives, all three of those artists produced and sold acres of such works on paper.

Tidal waves, earthquakes, stolen paintings

Lowenthal takes these thefts not only seriously but personally. Ten years with IFAR has done nothing to transform her into a cool, distanced observer of the art of art theft. "I try to rise above it the way the Red Cross rises above tidal waves and earthquakes. But we moan and groan when we hear that somebody has taken a work from a museum, especially—ouch!—if they cut it from its frame. That's vandalism as well as theft. We are also very elated when things are recovered." Thefts may be reported to IFAR by the local police or the FBI or, if they took place beyond our borders, by Interpol.

What can be "heart-wrenching," Lowenthal says, is direct contact with a victim. She still remembers every detail of a five-year-old telephone conversation with a woman whose Fifth Avenue home had been cleverly burglarized. Two thieves claiming to be workmen got into her unoccupied apartment and staggered off with a small, heavy safe that an unsuspecting doorman helped load into their vehicle. The safe held a modest fortune in jewelry, probably the robbers' chief interest. The woman didn't seem to have a care about her vanished diamonds. What concerned her was a Matisse sketchbook, the kind of personal diary of a great artist's musings that true collectors will die for. "It was her husband's prize possession, and he was so upset about the loss he couldn't talk about it. And she was so upset for him. Part of what we do is sort of relief work; we try to talk them through the theft and advise them of other actions, besides talking to the police, they might take."

A small staff with a big order

The "we" of Lowenthal's account could be assembled in an elevator. In addition to her assistant, a couple of part-time workers and an occasional volunteer, the staff consists of Anna Kisluk, a specialist in American decorative arts who has become the resident computer expert, and Nancy J. Little, director of the authentication service. IFAR was originally founded as a consumer protection agency against art forgery, and authentication was its earliest service. For a $1,000 fee and a signed pledge from an owner not to sue if the piece is finally judged to be a fake, Little, who is an art historian, will try to determine whether or not a work is by the artist whose name or style it displays.

It is, of course, thievery that now occupies most of the foundation's time and attention. A while back, Lowenthal was lunching with a now retired Los Angeles art cop on a visit to New York when he interrupted their talk to advise her paternally, "Stay in crime, Connie. It's steady work." So it is, but she worries about educating the art public on the duties of ownership. She wishes collectors would cultivate a degree of paranoia—well, all right—privacy. Lowenthal has firm rules for people with a lot of art: don't display a piece, even a hefty piece, in the window. If you allow pictures of your home to be shown in magazines, avoid mention of your name and your home's location. If you lend works of art to a museum exhibition, lend anonymously. If one of your pieces is stolen, notify the police, your insurance company, IFAR, art dealers who specialize in the item, and even pawnshops. Using the mailing lists of auction houses, IFAR can arrange to send out fliers with a photograph of the stolen item. Offering a reward is also a good strategy.

Then there is the matter of acquisition. Buyers must learn not only to ask themselves, Do I really like it? but also, Am I getting good title? Some museums, along with a few collectors, now routinely pay $50 an item to have IFAR scan its files for all contemplated purchases. Of course, she knows that no matter how visible and vocal IFAR becomes, fraud and theft will always be with us. The condition offers unease and comfort in equal parts. It guarantees that Constance Lowenthal and IFAR will always be needed.

Four recent recoveries

Clockwise from top left: *Island of San Giorgio Maggiore* by Francesco Guardi, stolen from a museum in Modena, Italy, was recovered in 1994; Petrus Christus' *Christ as the Man of Sorrows* was also recovered last year; Edvard Munch's *The Scream* was found after a massive three-month dragnet in Norway; Picasso's *Woman with Blue Collar* was recovered in Stockholm in 1993.

By Kathleen McAuliffe

Elephant seals, the champion divers of the deep

These ponderous pinnipeds continually set new records for diving to crushing depths; researchers are hard at work to discover just how they do it

A herd of elephant seals relaxes on the beach at the Año Nuevo State Reserve in California (above). As at home at depths of nearly a mile as on land, they hunt along seawalls for Pacific hake, dogfish (opposite).

The California bathers do not welcome a truck on the beach overlooking Monterey Bay. Annoyance quickly gives way to curiosity, however, when a coffin-shaped cage on the back of the flatbed becomes the center of activity. As parents and children gather round for a closer view, marine biologist Burney Le Boeuf signals a team of six to unload the crate at the water's edge. Out rolls Camille, a juvenile northern elephant seal with a video camera attached to her back. Big brown eyes blinking in the noonday sun, she circles once, snarls at her human abductors and then galumphs toward the ocean. Moments later, the world's first video-shooting elephant seal disappears under a big wave.

Le Boeuf, a professor at the nearby University of California at Santa Cruz, is gambling that the animal's homing instincts will guide it back to a beach on the mainland behind the island of Año Nuevo, a popular spring gathering ground of elephant seals 18 miles up the coast. "Let's hope by tomorrow afternoon we'll be sitting back with a beer, watching the first rushes," he enthuses. "You never know—the film might just reveal something we didn't expect." A moment later, his jubilant spirit falls prey to realism. "Or it might just be all murk."

Such are the risks of animal trials with undersea technologies. But the hope is that Camille will return from the deep with clues to how elephant seals have evolved

Illustrations by Sally J. Bensusen

Photographs by Frans Lanting

A team of researchers from University of California at Santa Cruz angles up to a tranquilized bull to keep him from reentering the water. Next they will attach instruments to him to record dive depth and duration.

into the greatest diving champions on Earth. These blimp-shaped creatures plunge to record-breaking depths—more than 4,000 feet—and stay down long enough to defy our understanding of physiological limits. They accomplish this feat with dizzying regularity, demonstrating an ease and endurance that no other marine mammals, not even the great whales, can match.

A self-professed "blubber lover," Le Boeuf is tall and rangy—proportions accentuated beside the rotund mounds of his favorite subjects. At 61, he is youthful of feature, especially when his face lights up in contemplation of the mystifying behavior of elephant seals. His infatuation with these creatures spans more than three decades, and it's easy to see why. Whether on land or at sea, almost everything about these animals is exceptional, bizarre, barely believable (SMITHSONIAN, April 1978).

To behold the behemoth bulls is to be transported back to the age of mammoths. Sporting trunklike proboscises and necks as thick as chimney stacks, they typically stretch from 16 to 18 feet in length and weigh from two to four tons. During the mating season, the bulls bellow and charge one another on the beach, delivering bloodletting bites to the neck. The winners of these macho contests command among the largest harems of any mammal, with a single victor sometimes inseminating as many as 100 cows. No less wondrous, females fast the entire month that they nurse their pups. Says Le Boeuf, "You can only talk about these animals in superlatives."

Scientists had no inkling of their extraordinary diving feats until the introduction of portable depth-recording equipment in the early 1960s. The earliest prototypes were tested on Antarctica's Weddell seals, which returned from the frigid depths registering dives of nearly 2,000 feet. Awestruck, scientists launched a series of studies that led them to revise radically their theories of how marine mammals withstand oxygen deprivation and crushing depths. The first elephant seal to dive with recording equipment immediately broke the record set by Weddell seals. Then, in 1988, results of a new pilot study sent the biologists reeling back to the blackboard. Three northern elephant seals made such steep descents that the recording stylus went right off the charts. The animals had exceeded depths of 3,300 feet. "Our theories were blown clear out of the water," recalls Le Boeuf. "They were breaking every record in the book."

Today Le Boeuf still can't say for sure just what their true limit is. Although a northern elephant seal recently reached slightly more than 5,000 feet—just under a mile—he doubts that that record will go unchallenged for long. "It seems like every time we put a dive recorder on an elephant seal it breaks a new record," he laughs.

A mile below the surface, water crushes with a pres-

Kathleen McAuliffe lives in Florida and writes frequently about marine science. Her deepest recorded dive, however, is nine feet, to the bottom of a pool.

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A subdued bull submits as Russ Andrews, Dan Crocker and Susanna Blackwell prepare mount on his back.

The seal's heart rate will be monitored with a tiny recorder and charted with the aid of a laptop computer.

Susanna Blackwell tracks a radio-equipped juvenile in the vast throng of sleeping seals at the tideline.

sure of more than a ton per square inch. "Things just implode at those depths," says Le Boeuf. "Many of our earliest instruments were made of metal and looked really tough, but after being deployed on animals, they came back all pushed in from the pressure." Many animals do live at such depths, but they die when pulled to the surface. Elephant seals appear to be equally at home at depth and at the surface—environments as different as Earth is from the moon.

To appreciate their tours de force, Le Boeuf asks us to imagine four Empire State Buildings stacked one on top of the other. An elephant seal is capable of descending from the uppermost floor of the top building to the base of the bottom building in about 20 minutes. It then ascends at the same speed, making the round-trip journey of almost two miles in just 40 minutes.

Any human scuba diver foolish enough to attempt such exploits would soon fall unconscious from nitrogen narcosis ("rapture of the deep") on the way down or die of decompression sickness, a frothing of the nitrogen in the blood associated with "the bends," on the way back up. The unfortunate diver could also writhe in convulsions from oxygen toxicity below 300 feet or from high-pressure nervous syndrome (HPNS). The bane of deep-sea divers, HPNS occurs in most mammals at depths below 600 feet when mounting pressure on the body triggers an increased excitability of nerve cells, culminating in possibly fatal seizures.

By contrast, the elephant seal shows no signs of distress. Within minutes of surfacing, it pushes its big schnozz back under the waves and repeats the same miracle all over again. What's more, this virtuoso diver can remain submerged for seemingly impossible durations. A southern elephant seal recently logged two hours down under. How do they do it?

Marine biologists have been trying to coax the secret from these Olympian divers for more than a decade. Aware that colleague Randall Davis, chairman of the department of marine biology at Texas A&M University at Galveston, was studying Weddell seals by attaching video cameras to their backs, Le Boeuf proposed a collaboration. The rationale of recruiting the elephant seals to spy on themselves was irresistible and the men quickly reached an accord: Le Boeuf would supply the animal and Davis would supply the camera.

From the start, neither scientist expected this first-of-a-kind trial to yield a bonanza of new information about deep-diving mammals. Rather, the main goal was to test the basic feasibility of the concept. Could a video camera be securely attached to an elephant seal? At what angle should the lens be positioned? How would the animal react to the camera? How would the camera be retrieved at the end of the experiment?

Because of the logistical problems involved, Davis immediately nixed the idea of risking a still-in-develop-

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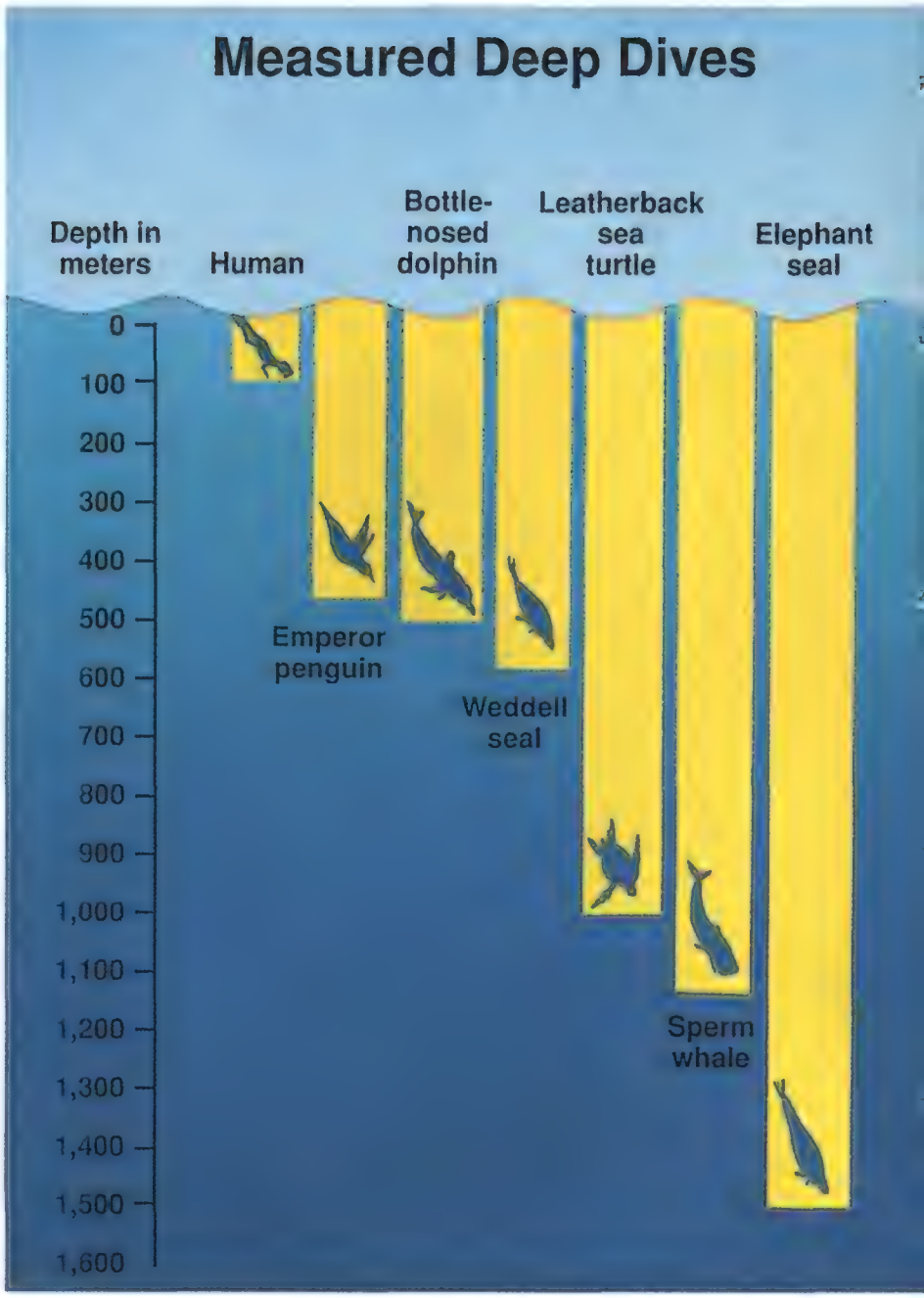
Champion deep-diving elephant seals



A human holding its breath can reach only a fraction of the depth of other divers. Elephant seal limits are still unknown; new records are often set—and broken.

ment, $24,000 state-of-the-art underwater video camera for the pilot study. The $1,500 conventional camcorder he brought instead would function down to only 60 or 70 feet. Below that, the picture would fade to complete blackness, and worse, below 1,000 feet the pressure on the camera's housing might cause it to crack, permitting water to seep in and destroy the tape.

Given these limitations, the optimal conditions would be in shallow, well-lit waters. But restricting a free-roaming creature in an aquatic habitat is easier said than done. The solution the scientists ultimately lit upon was far from fail-safe. Rather than releasing the seal miles out at sea, they would set it free from the Monterey shoreline during the spring molting season, when seals taken from Año Nuevo usually make a beeline back to their colony to complete the shedding of their coats on land. The camera mount would be attached with—of all things—epoxy. The camera could be retrieved at the trial's end, and when the seal molted, the mount would simply fall off, and the seal would be none the worse for wear. In the parlance of scientists, this would be a "shotgun study." As Le Boeuf explains, "We're not pursuing precise goals. There's so much we don't understand about these animals that we're trying to cast as broad a net as possible."

Elephant seals do not rely on oxygen from the lungs to sustain them during long dives (as diving birds and turtles do), Le Boeuf explains. Rather, the oxygen is stored in blood and muscle. The lungs of Weddell seals actually collapse at from 30 to 40 meters on the way down and reinflate at the same level on the ascent. Biologists believe this also happens in elephant seals.

Marine mammals bring down a vast auxiliary supply of oxygen in their blood. That is possible, according to Le Boeuf, because blood constitutes as much as 20 percent of their body weight, in comparison with only 7 percent in humans. What's more, research by Jesper Qvist of Herlev Hospital in Copenhagen suggests that the spleen of Weddell seals may double as a scuba tank. According to this theory, the organ serves as a reservoir of oxygen-rich red blood cells which, under pressure, are squeezed into the circulatory system. Qvist and collaborators discovered that the organ is abnormally large in Weddell seals, equaled only in southern elephant seals. The idea is not unprecedented: racehorses also use the spleen to shunt oxygen-rich cells into circulation during exertion. Adding to the seals' reserve, a molecule known as myoglobin enables them to store oxygen in their muscles.

Though masters at hoarding oxygen for their submarine plunges, aquatic mammals cannot carry down an infinite supply. Consequently these animals conserve oxygen by lowering their metabolic rate. At Long Marine Lab, where Le Boeuf's team does most of its indoor work, graduate student Russell Andrews shows off a

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Dr. Burney Le Boeuf charts an elephant seal dive in his Santa Cruz lab; video data (below) were collected by attaching a camcorder to a diving seal's back.

sophisticated new probe no bigger than a Walkman. "This," he says, "goes way beyond the standard depth recorder. In addition to measuring how deep the seals go, it also tracks their swim velocity, heart rate and body temperature."

By charting these physiological measurements, researchers in Le Boeuf's lab have documented a number of startling changes in metabolism during diving. Elephant seals lower their temperature by from 5 to 6 degrees F before long dives. At depth, they shut off circulation to the kidneys, stomach and other organs, conserving more oxygen. Meanwhile, their heart rates slow from 120 beats per minute at the surface to as low as 6 per minute on the bottom. For brief spells, elephant seals have even been clocked at 2 beats per minute. That's 30 seconds in between pulses—an acute case of cardiac arrest by human standards.

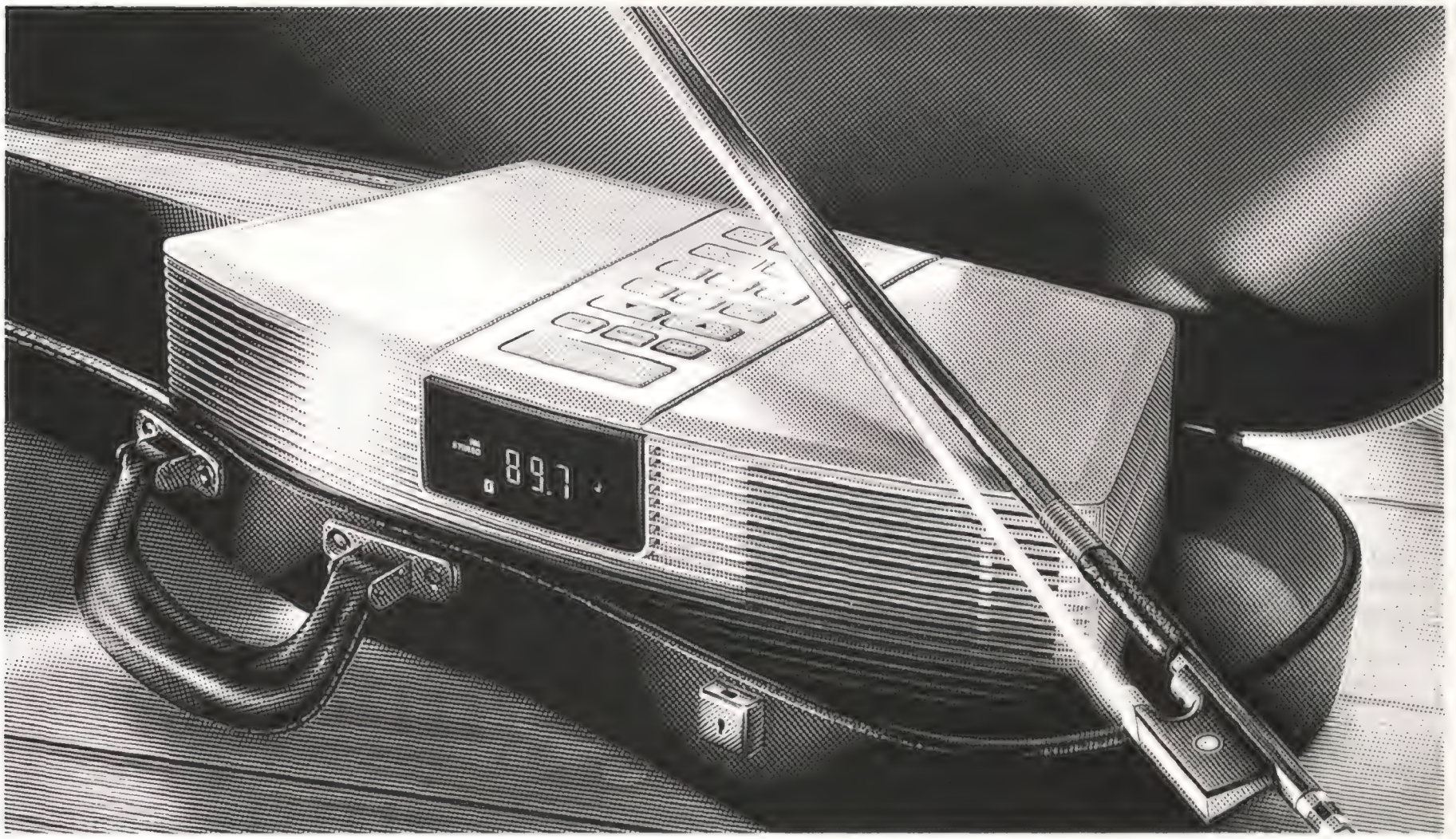
If the Weddell seal is a source of wonderment to scientists, the elephant seal is downright mystifying. Not only does it dive deeper and longer, but it does so again and again, barely pausing at the surface. While Weddell seals rest from 11 to 13 hours out of every 24, the elephant seal never seems to sleep. In the mid-1980s, using a long-running time-depth recorder, Le Boeuf's team made a discovery that shook him more than any other finding of his career. The recorder revealed that elephant seals were diving continuously, 24 hours a day, week after week, for as much as eight months at a time. "No one could believe they were doing this," says Le Boeuf. "Think about it," he beckons. "These mammals spend more than 90 percent of their lives in the utter darkness, at crushing depths, with their lungs collapsed and their hearts barely beating. Floating along in this state of suspended animation, they are probably alert only to their prey."

How do these animals stay submerged for so long? And why do they dive so relentlessly? Is it to hunt for food? Or to escape becoming food themselves? Finally, when—if ever—do they get a wink of sleep?

Alas, research on an animal as large and unwieldy as an elephant seal presents special challenges. The males are particularly difficult to study. Given their feisty tempers and massive size, obtaining the simplest measurements can require legions of people—and not a little ingenuity. To weigh a two-ton bull, Le Boeuf's students lure the animal toward an electronic scale on the beach, using a life-size decoy of a female. The model has a wagging tail and a speaker that blares the sounds a cow makes when being mounted.

Happily, the comparatively docile and diminutive cows are more cooperative subjects. Better still are juveniles like Camille. Weighing from 300 to 350 pounds, they can usually be hoisted from the beach to the lab by a small posse of researchers with a truck. When agitated, however, even these youngsters can be trouble. And seals of all sizes can bite when least expected. Stitches are usually the worst repercussions of such attacks.

From analyzing the depth recordings of hundreds of elephant seals, Le Boeuf now believes that the vast majority of their dives are foraging expeditions. After leaving Año Nuevo and other rookeries along the California coast, the cows migrate to an area west of Washington State and north of Hawaii, consuming about 40 pounds of seafood per day on the way. They find an abundant supply by plunging to the "deep scattering layer." (The name comes from its effect on the sound waves used to measure depth in the ocean.) This is actually a collection of bands, each populated by particular fish and other marine creatures, that is found at depths of from 1,500 to 2,400 feet during the day. At night, some of the bands rise to within 300 feet of the surface. Most of the fish in the deep scattering layer are small, fierce-looking and bioluminescent. "They're generally not diving to



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A contest for a position at the outer edge of a dominant bull's harem pits two young bulls against each other; they will bellow and bite until one surrenders.

the bottom," Le Boeuf emphasizes. "They're just diving down as far as this floating patch of food."

The larger bulls follow a similar foraging strategy en route to their primary feeding ground farther north, near the Aleutian Islands. Once there, they dive to the tops of seamounts, where they lie in wait for prey. Among the animals whose remains have been recovered from their stomachs are skates, rays and sharks—some as long as six feet.

Why they dive so deep when they could make a far easier living nearer the surface is an evolutionary puzzle. Le Boeuf is not even sure how well they can see their prey, for they descend so quickly that their eyes have little time to adjust to the inky blackness. By venturing where no other large competitors dare to go, however, elephant seals have gained a virtual monopoly on some of the richest marine waters off the continental United States. And by spending so little time at the surface, they reduce their risk of being devoured by two formidable predators that patrol shallower water: the great white shark and the killer whale.

Elephant seals present another mystery: why the animals never seem to doze at sea. No mammal so far studied is known to forgo sleep for weeks—much less months—at a stretch. The only seals that can even come close to these perpetual-motion machines are a few species of sea lions, which dive for three days before coming ashore to sleep. Even sperm and humpback whales regularly alternate diving and resting on the surface for 30 minutes to several hours.

Could elephant seals once again be breaking all the rules? Le Boeuf wouldn't doubt it, but in this instance he subscribes to a still more radical belief. The animals, he speculates, sleep submerged. One likely time that they may be dozing, he proposes, is during drift dives, when they float down and up rather than actively swim. "My guess is that they don't sleep like us—but they reduce their level of vigilance once they're outside the range of predators below 130 feet," says Le Boeuf. "That would give them about ten minutes' rest on the way down and ten minutes on the way up."

Le Boeuf points out that elephant seals sometimes hold their breath while sleeping on land. "The analogue at sea would be that the animal sleeps while diving," he argues. Graduate student Susanna Blackwell used a stopwatch to time the breathing rate of animals as they slumbered on the beach. She measured bouts of suspended respiration, known as sleep apnea, typically lasting 10 minutes and sometimes stretching up to 23 minutes, interspersed by 2 to 3 minutes of regular breathing. "We call this 'terrestrial diving,'" she says, "because during sleep apnea their heart rate goes down, and they lower their metabolism in ways that parallel what happens during diving."

Not everyone believes that elephant seals doze thousands of feet beneath the waves. Dan Crocker, another graduate student of Le Boeuf's, argues that these nonstop diving machines don't need sleep. "One of the major theories as to why sleep evolved in land mammals is to conserve energy for several hours each day," he observes. "Yet here we have an animal that can actively swim and forage at about what it costs it in energy to lie around on the beach and rest. So the physiological adaptations of diving may have taken care of the evolu-

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tionary requirements that sleep would normally fulfill."

As to why the animal sometimes drifts, rather than swims, up and down, Crocker believes the animals stop swimming during some dives to digest food, so that oxygen that would ordinarily be channeled to the muscles can be rerouted to the gut. "This is a classic response to feeding," he points out. "You wouldn't want to swim or exercise after a big meal either."

After a heated debate in which all the participants have worked up a sweat defending their positions, Le Boeuf loves to rock back on his heels and then pose to his team a devastating question. "Now that's a good story," he begins enthusiastically. "But can we prove it?"

For all the reams of data and rich abundance of theories, the most basic answers are not yet in hand. The question of whether the seals sleep while diving remains open. The species' resistance to high-pressure nervous syndrome also remains a profound enigma. Most problematic of all, no matter how the scientists tweak the equations, they can't explain how an elephant seal can stay submerged for as long as two hours. Taking into account all the animal's marvelous adaptations for conserving fuel, it should still run out of oxygen within 50 minutes at most. Yet there's no evidence that the animal switches to anaerobic (without free oxygen) pathways of energy production at the end of a long dive. Consequently, scientists have been forced to conclude that elephant seals must parcel out their oxygen by suppressing their metabolism further than anyone has yet measured. And therein lies the central paradox of diving. In their cold, torpid state, with their heartbeat suspended, they are supposed to be stalking highly mobile prey—an activity normally associated with rigorous exercise.

The answer to these riddles is not just of academic interest. The Navy, among others, is eager to know how the animal protects itself against nervous convulsions at depth, for this deadly reaction is the single greatest impediment to scuba divers who want to go deeper than they now can. At the University of Alaska, marine biologist Robert Elsner is keen to study how seals regulate their heartbeat, with the goal of uncovering new strategies for controlling arrhythmic human hearts. He is also fascinated by how they lower their temperature and other metabolic functions during dives because these adaptations, he believes, could help to shed light on how young children sometimes survive being submerged in icy water for more than half an hour. Still other researchers are scrutinizing both Weddell and elephant seals for clues to the cause of sudden infant death syndrome, which occurs when babies stop breathing during sleep.

Clearly, marine biologists have their work cut out for them. Camille proved maddeningly unpredictable in her pioneering trial. Expected back at Año Nuevo within two days of her release, she instead took a detour that delayed her return by a week. But after apparently wandering off the continental shelf into deep water, she did return to land. The camera housing held up to depths of 2,600 feet, and the film was retrieved undamaged. Le Boeuf and Davis declared the mission a success.

"There's a great shot where you can actually see the cliffs off the coast where the seal came up," reports Le Boeuf. "Then it quickly heads toward the twilight zone of blue water. You feel like you're in a space odyssey with jellyfish screaming by like asteroids. Mostly though, the animal is in pitch-black water."

Davis, on the other hand, seems to be more excited by the technical aspects of the production than the film itself. He offers rave reviews of the technique used to secure the camera to the animal's back. "The attachment work was dynamite," he enthuses. "I was afraid the camera might fall off, but it held rock-solid."

All in all, not bad for a pilot study. But virtually everyone agrees that the real potential of this approach lies just around the corner, as Le Boeuf, Davis and other scientists get ready to outfit animals with a new generation of pressure-resistant cameras equipped with lights that will allow taping but are invisible to the animals. In theory, such equipment should have no trouble penetrating the oppressive darkness and the crushing forces of the abyss. Of course, the technology doesn't come cheap. But while the risk is great, so too are the potential rewards. With luck, the scientists might catch these champions of the deep slurping down a squid, wrestling with a six-foot-long shark or perchance sleeping. Through the lens of the camera, their theories could be confirmed . . . or dissolved in a flurry of bubbles.

One flip of the tail, and a sand shower rains down on a molting female; sand may protect new skin from hot sun.

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By Kevin Krajick

Don't look now, but here come the bladerunners

Whether stunting on the streets, gliding off to work or lining up for the orthopedist, nowadays in-line skates are the way to go

Born to blade: a cadre of friends called the Tuesday Night Skaters cruises near Manhattan's Penn Station.

The guy with the salt-and-pepper hair and Connecticut license plates was looking bewildered, aghast, enraged. It was a steamy late-spring afternoon and he was trying to force his BMW up vehicle-clogged Third Avenue in lower Manhattan. Suddenly they appeared: 17 fast-moving adolescent boys and girls on in-line skates, swerving, swooping and circling through traffic like a flock of wild birds in a tornado. Three or four dodged a pothole deep as a drilled well and narrowly missed running into a *Daily News* truck. Sixteen-year-old Anthony Cruz of the South Bronx jumped the hole, turned 360 degrees in midair with balletic grace and kept going. Three of his friends grabbed the moving back bumper of a black Jeep Cherokee and clung like wheeled barnacles, whooping "Giddyap!" Notebook in hand, I was just trying to skate fast enough to keep up—and live to tell this tale.

"Hey!" screamed Mr. Connecticut at me through his rolled-down window. "Are these kids with you? What organization is this? Can't you get those kids under control? I'm gonna find out who you are! I'm gonna report you!" And so on for two obnoxious blocks. "Sir," I kept trying to interrupt. "Sir . . . sir . . . *sir!* They're not with me—*I'm with them.*" I don't think he heard the rest, so here it is. Spread the word, sir: it's not an organization. What it is, is the biggest thing on wheels since bicycles. No, I *can't* control those kids. Neither can you, though you sure would like to try. OK, they're pretty reckless. But calm down. Everything's going to be all right.

In-line skating is not just America's fastest-growing sport—it has become part of every purpose under heaven. On skates, there is a time to commute, a time to exercise, to race, to dance; a time for hockey, for basketball or for new sports altogether; a time to walk the dog, to make friends, to earn your bread; a time to fall in love.

No one thought it would go this far. Every year of the 1990s, as the number of in-line skaters doubled, tripled, quadrupled, pundits said the "fad" would peak. But 1994 saw the biggest leap yet—to 19.5 million skaters, not counting scads of kids under 7. Growth in 1995, with projected skate sales of $1 billion, signals another booming year. In-line skating is now more popular than amateur baseball or football. Skaters are split almost perfectly between males and females; they span all geographic regions, economic brackets, ages and ethnic groups, embracing inner-city kids to Amish farmers; more than half of skate-literate citizens are under 17, which makes skating as much the future as is cyberspace.

But there is conflict and danger, much as when the automobile came along and scared the horses. Hordes of beginners are running amok, spooking pedestrians, injuring themselves by the tens of thousands and enraging motorists like Mr. Connecticut. A number of towns are coming down with restrictions. But skaters are fighting back with increasing success. "We've moved from a lunatic fringe that people love to hate, to the mainstream," says New York attorney Kent Correll, counsel for the International In-Line Skating Association (IISA), the industry's trade group.

Before we go any further, I'll admit a point of view: last autumn my friend Lisa convinced me to try skating, some 30 years after I turned in my skate key, around age 12. Soon I understood the allure. I didn't want to take the skates off, because it was liberating to fly on wheels where something so pedestrian as feet had once served. And I made friends: skating strangers would *actually talk to me.* Now, I glide down the street on the way to work, to the movies—to the rest of whatever life brings.

Photographs by Jonathan Atkin

However, this story begins not in the street but in Central Park—East Coast epicenter of in-line skating and its main battleground. It was there that I met Anthony and a dozen of his buddies at the 36 stone steps leading down to ornate Bethesda Fountain. The kids were sprinting to the steps' brink, turning 180 degrees in midair and clattering to the bottom, backward, on their wheels. Bystanders applauded and threw subway tokens. Everyone was ready to disappear if the police showed up; "stair riding" and other techniques of "aggressive" skating are targeted for suppression this year because of complaints about damage being done to stairs and railings, and the possibility of injury.

Outdoor dance skating is under fire too. Nearby, six police and ranger vehicles were enforcing a ban on music at the Skate Circle, a paved area where hundreds of funky artistic skaters and spectators normally congregate around a deejay. Weekends, thousands of skaters whiz through the park. They often seem to outnumber—and compete with—annoyed bikers and pedestrians. "It's a tidal wave," says Capt. Bill Bayer, of the NYPD's Central Park Precinct.

While the war of the wheels seems a very '90s phenomenon, in-line skates and skating booms are nothing new. The first documented reckless skater was Belgian inventor John Merlin, who affixed metal wheels to his shoes in the 1760s and promptly crashed through a mirror as he cruised through a masquerade party while playing the violin. He'd forgotten to figure out how to stop—a problem beginners have today. The first patented skates, registered in 1819 in Paris by M. Petitbled, were in-lines—that is, with wheels in a straight line from front to back. So were many models that were made for decades in Europe and the United States. But all were unstable and hard to turn.

Then, in 1863, James Plimpton, a New Yorker who missed ice-skating during warm weather, invented the traditional, or "quad," skate: two sets of side-by-side wheels, attached to india-rubber trucks, that made turning easier. With the improved design, Americans and Europeans went skate-crazy. Plimpton sued 300 copycat manufacturers on both sides of the Atlantic. By the 1880s there were 3,000 U.S. skating rinks, a thousand more than today. Since then, skating has weathered boom-and-bust cycles but each time has roared back with some new wrinkle. Roller hockey and racing revived it at the turn of the century. In the 1940s and '50s, figure skaters and stuntsters like the Skating Vanities toured the world. Roller disco—funky dancing on skates—erupted in the '70s. If you don't remember clattering down the sidewalk with steel wheels strapped to your Buster Browns, you were either cheated or grew up on a dirt road.

All those fond memories, of course, were formed on quads; a few companies made in-lines, but they never caught on. Until Scott Olson. In 1979 he was a 19-year-old rink rat from a suburb of Minneapolis playing junior league ice hockey. Looking for a way to skate off-ice—like Plimpton—he found a pair of dusty in-lines in

a sports store. "I was blown away by the way they felt—I couldn't take them off," he says. He hitchhiked to Chicago to buy the Chicago Roller Skate Company's dormant in-line design; in the basement of his parents' home, he came up with the innovations that made in-lines take off: a light plastic ski boot for ankle support, fast-running dual bearings and polyurethane wheels. The skates were easier for beginners than quads, absorbed bumps better and went a whole lot faster. Olson called his company Rollerblade.

Hockey players ate up the skates; then others started latching on. But by 1985, with sales at $300,000, Olson was nearly bankrupt—he claims a friend embezzled from the company—and he sold out for $100,000. Rollerblade became synonymous with in-line skates, and last year controlled 50 percent of the $700 million market. We can't feel too sorry for Olson; a 1 percent royalty until 1997 will probably net him $10 million.

Besides, he's busy. His main project now is the RowBike, a bicycle you power with your arms and legs. One day I skated around midtown Manhattan while Olson RowBiked alongside. People kept stopping us to ask, "What's that?" "RowBike!" he puffed. "Got it in Minneapolis. It's really great!"

Rollerblade hit critical mass in 1989, with three million skaters. After that, the market exploded. Now, some 40 companies make in-lines ranging in price from $27 to $600. In 1994, industry sales were up 130 percent. (The old-fashioned quads are not dead either, though certainly in decline; 14 million people still use them.)

The key to the sport's vitality is its versatility. An increasing number of adults cruise weekdays into the streets to their workplaces. "I always wear my tie when I skate to work," says 24-year-old Michael Stern, who travels 60 blocks each way to a midtown Manhattan financial house. "The taxis give you more respect." Transportation Alternatives, a New York group that promotes walking, biking—and as of this year, skating—estimates that in New York City 5,000 people skate to jobs (75,000 use bikes). Director John Kaehny says that while skaters constitute only 0.5 percent of street traffic, their numbers could outstrip bikers' if the city goes ahead with plans for more bike-and-skate lanes.

In Fort Lauderdale, Florida, Sgt. William Johnston even leads a five-officer rolling patrol along the city's beachfront. "I've arrested a number of people breaking into cars," he says. "The last thing they expect is some guy rolling up on skates." Others who make a living on skates: messengers, skate instructors and stunt skaters.

Most, though, skate for fitness, fun and friends. Occasionally I join New York's Tuesday Night Skaters, a loose bunch of grown-up kids that meets every week at 8 P.M. on West 72d Street near the park. One recent evening 35 of us headed uptown on Riverside Drive along the Hudson River, across the George Washington Bridge and into the parking lot of the Dairy Queen in Fort Lee, New Jersey. After an ice cream break, we dashed back. Round trip: 17 miles. I was nearly dead the next morning—but I

The in-line skating bug bites everyone: from the left, July 4th reveler and blade ace Felix Santiago, commuter, skaters tall and small, helmeted kid, wheel whiz, mom with stroller.

Superstars on skates, 15-year-old Anthony Cruz (above, front) and friends defy gravity on a daily basis. At center, a young skater "grinds," or slides across edge of a step, while another (right) fearlessly rides a rail.

was back the next week for a short but successful incursion into the rinklike Jacob Javits Convention Center.

Many skaters have gone on to take up spin-off sports. By far the biggest is roller hockey, America's fastest-growing team sport. It had 2.2 million players last year, outstripping its ice sibling. The National In-Line Hockey Association, started in 1992, now has 350 *leagues*. But most games are spontaneous pickup affairs at places like the Happy Warrior Playground, a few blocks from Central Park on West 99th Street. Disney Prawatyotin, 13, and his buddies had already started kicking around a ball with their skates. Then Disney saw an ice hockey game on TV, and the light bulb went on. The next week everyone had $8 sticks; two tipped-over garbage cans served as the goals. Roller hockey had arrived on 99th Street.

Thirty-year-old Kaz Vichitlakakarn, an uncle of one of Disney's skating buddies, often comes by to pitch in. Vichitlakakarn, who lives on the other side of the park, has to skate on the Loop to reach the game; sometimes he's deterred by the speed skaters. "They scare me," he says. On special five-wheel skates (regular ones have four), they tear along the silky paved drive at 20 to 30 miles an hour in helmets, sunglasses and fluorescent Spandex, training for some of this year's 365 races.

On weekends both the speedsters and the far more numerous recreational skaters who "do the Loop" pause by the hundreds next to the Loop's in-line slalom course, which straddles the finish line of the New York Marathon near West 67th Street. There, they take in the "coneheads," slalomers who twist and weave around 27 orange traffic cones with such impossible-to-explain moves as the alternate backward crisscross, the half remi and the rattlesnake. In-liners took the idea to near-Olympic levels and last year held the first National In-Line Skating Slalom Championship.

Skate a little farther on the Loop and you'll pass the outdoor Wollman Rink, site of last year's National In-line Basketball League championships, organized by 40-year-old NBA vet Tom LaGarde. LaGarde, who quit pro ball after blowing out his knees, found in 1992 he could return to his sport if he did it on skates (he stands 7 feet 1 in them). Self-appointed NIBBL commissioner and a star player, he promotes the sport full time.

The most startling sport—well, "sport" doesn't do it; try "all-consuming, obsessive renegade lifestyle"—is aggressive, or "extreme," skating. The extreme skaters' average age is 15, young enough to have both spare time and a sense of immortality. For them, the city's curbs, stairways, railings, underground traffic tunnels, fire hydrants, trash cans and motor vehicles, both parked and moving, are little Everests awaiting conquest. The more dangerous and/or semi-illegal your tricks, the better.

Did you ride backward down the 30 steps of the Parthenon-like Supreme Court of the State of New York (a favorite haunt)? Then you've "busted a fat trick" (done a cool stunt). Scrape your elbow? The bloody boo-boo is your red badge of courage.

One spring Saturday morning I met Anthony and his buddies Hector Oquendo, Joey Valentin and Charles Williamson in their bombed-out South Bronx neighborhood. "It's heavy where we live," said Anthony. Drive-by shootings happen, and there's not much room for childhood. Joey once hitched a ride on the bumper of a Mr. Softee ice cream truck whose driver swung around and targeted him with a double-barreled shotgun ("When I saw those two little holes pointing at me, I let go"). We rode the subway into Manhattan and emerged near the Supreme Court building, already swarming with weekend stair riders. The most daring were ski-jumping ("grabbing some air") off a giant curved stone parapet before hitting the steps 20 feet or so later. When a guard showed up, we left and skated through the dim, narrow halls of a public-housing high-rise near Chinatown to pick up Alphonso and Athena Leung, Anthony's skating "cousins." Outside, the kids extemporized 27 ways to leap off a high curb. Alphonso, 12, could do a perfect 540-degree turn; Anthony kept trying but couldn't hit it right.

We made our way uptown (having our encounter with Mr. Connecticut on the way) and ended at Central Park—by this time there were 18 of us—to do some "grinding." To grind steps you jump on the lip of a long step and slide across it sideways on the skate frame (ten feet is pretty good; if you can make sparks fly, you're really dealing). For rail sliding, you jump up *on the stair railing* and slide down. The park's many ornate stone and iron rails are 20, 30, 40 feet long and squirreled with bumps and weird curves—not for *pollos* (chickens).

Such antics have escaped the cities into the suburbs and beyond, via the transmission route of radical skate videos. In productions such as *The Hoax* and *Mad Beef*, the deans of extreme, like 22-year-old Californian Arlo Eisenberg, provide ideas for kids from Kansas City to New Hampshire. Many put the tapes on slo-mo every day to analyze technique and can recite the dialogue of every scene. Take the sequence in *Mad Beef* where another topflight skater rides the world's longest railing—244 feet, on a hillside in back of a high school in Omaha, Nebraska. When Andy Georgalas, a 19-year-old New York college student, saw this, he and two friends bought discount plane tickets to Omaha, found the rail at 3 A.M. and slept on the grass next to it à la pilgrims. At sunrise they leaped up and rode all day, pausing only to gobble airline sandwiches that a sympathetic stewardess had given them. Next morning they flew home.

The obvious question: Why? Says the revered Eisenberg, who called me from "a Laundromat in Colorado" while on the road for his latest video. "Jumping on a rail and possibly getting hurt is life's lesson: either you're gonna commit yourself to something or you're not."

It also supplies a dream. When Anthony discovered skating three years ago, he put away his video games. Now his ambition is to "meet Arlo," become a pro skater and move to California, where "you can be outside year-round and there's no shooting in the night." He skates four or five hours on schooldays, morning to night, weekends; he'd stay out all night practicing that 540-degree turn if his mom, Carmen, who raises him alone, didn't demand an 8 P.M. curfew. One night he fell asleep with his skates on; Carmen unlaced them. Alphonso and Athena's dad, Hong Kong immigrant Albert Leung, says: "I know they skate all over the city like nomads. But they get to see other neighborhoods. They're working at something instead of hanging out on the corner."

While kids bouncing down the Bethesda stairs represent skating's yearning young edge, the heart of its oldest community is struggling to keep beating at the Skate Circle, a few skate-strides away. The Circle is delineated by a white line that quad-skating disco dancers painted

While New York freelancer Kevin Krajick works at perfecting his backward-skating technique, he is also recovering from a recently skinned knee.

Rollerblade founder Scott Olson promotes newest creation, the RowBike. His skates have caught on with millions, from cruisers on Central Park's Loop to the dean of in-line basketball, NBA vet Tom LaGarde.

on Dead Road, a closed-off drive. "You can do whatever regular dancers do, but on wheels it's all more interesting," says top Skate Circler "Roger G" of Brooklyn.

"Swinging" dance skating—shaken up by blues, jazz, hip-hop—predates the Circle. In 1945 Bill Butler, author of the dance-skate book *Jammin'*, picketed the Arcadia Rink in Detroit to admit blacks; he was 12 years old. When they got in (on segregated nights), Count Basie's "Night Train" jumped off the turntable, replacing the rink's pallid organ music. "We skated in the idioms the music demanded," he says. At 61, he's still at it.

At the Skate Circle, a transistor radio on a garbage can first served for music; later it was a boom box with cassettes. In autumn, skaters swept the leaves; in winter, they shoveled snow. Dozens met husbands and wives there, had kids, got divorced, found new romance, all within the Circle. Their kids skated. When youthful inliners dribbled in around 1992, they were regarded as unskilled fadsters. Then, supreme quad artists like 29-year-old Puerto Rican native Felix Santiago and Roger G started switching over.

The Skate Circle itself mirrored the gorgeous mosaic of their dancing. When I stumbled upon the Circle one sunny October day, leaves were swirling rapidly down from the graceful oak and beech trees. Underneath them the racism of Bill Butler's childhood had dissolved; people of all colors were shaking, winding and hopping together—a rare sight in New York. Bags and purses were thrown into a communal pile in the middle—and were not being stolen. I felt I had finally discovered the secret, beautiful heart of my city.

As in-line skating took off, crowds of fresh skaters on blades flocked here. Attracted by donations from the swelled crowd, deejays wheeled in three-foot speakers run by car batteries. Soon there were three circles. TV crews and tourists from Russia and Australia showed up. So did pickpockets and drug dealers; police claim that one dealer was protecting the turf with an Uzi. The Central Park Conservancy, which donates millions to the park, lobbied to silence the booming music. On the

Loop, cyclists and runners grumbled that novices were causing crashes and taking up too much space.

First, police dismantled a plywood jumping ramp built by stunt skaters near the Skate Circle and kicked out the hockey players. Then, one Saturday last March, the dancers found a dozen uniforms waiting for them. "You can skate, but no music," they were told. Skaters protested with signs and a 7,500-signature petition. At an Easter Sunday demonstration a guitarist sang unprintable lyrics about Parks Commissioner Henry Stern; officers escorted him away. Just as things seemed about to turn ugly, the skaters suddenly joined hands around the police and sang "The Star Spangled Banner."

Diehards now come with Walkmans; a homemade short-radius transmitter in the Circle's center broadcasts music to the plugged-in, but there are fewer of them. Many still go on Wednesday nights to Manhattan's only surviving indoor rink, the Roxy. But you have to pay $12—and there are no oak trees. There is hope. The dancers have gathered support and lobbied the city for a quieter, gentler circle—one with low-impact speakers they'd shut off when the crowds swelled.

Similar battles are being played out in dozens of other cities and towns. Probably the place with the most regulations is Washington, D.C., where laws and codes prohibit skating on monuments, streets and the 40 square blocks around the Capitol. Where laws don't exist, local prohibitions do. In New York, "No Skates" signs have appeared on many shop doors, just below the signs saying "No Dogs." The Los Angeles city schools prohibit roller hockey—even though basketball and other sports are played on school grounds. "We have basketball and volleyball poles embedded in the ground, and cracks in the pavement, creating hazards," says administrator of student activities Jim Sugahara.

The threat of injury is real enough. Most are just scrapes of the "road rash" variety (a nastier version is "road pizza"). But the number of skaters visiting emergency rooms with worse hurts has skyrocketed: 76,800 last year, double the 1993 figure. The most common

A "wobbler" tries to regain balance. For novices, lessons—plus protective pads and helmets—reduce injury risk.

traumas were wrist fractures and dislocations, according to the Centers for Disease Control and Prevention. At least 25 people have been killed on skates since 1992, the majority in tangles with motor vehicles, including the kind of ride-hitching ("skitching") city youngsters do. The statistics must be put in perspective, though: baseball caused 413,000 emergency-room visits last year; bicyclists suffer about 1,000 deaths a year.

The Consumer Product Safety Commission has made in-line skating a priority for 1995, but chairman Ann Brown says, "There's nothing unsafe about the product itself. The number one problem is beginners get rolling before they know what they're doing, and they don't wear protective gear." That problem is acutely visible in Central Park. For live-action interviews, I simply station myself at the bottom of a steep hill. Within minutes, a Columbia grad student crashes in front of me, skinning her left elbow. Her friend smacks down on his butt right behind her. "How do you stop?" she asks me.

Conscious that injuries will hurt the industry, manufacturers have gone on a big safety binge, encouraging users to wear knee and elbow pads, wrist guards and helmets, and recommending free lessons on how to stop. The normal method is to lift up your toe and press down on the pavement with a rubber heel brake. This throws some novices off balance, so Rollerblade came out last year with a brake that goes down automatically without your having to lift your foot. But as any experienced skater knows, you have to learn how to skate.

Besides battling injuries, the industry is fighting on the political front. The well-funded IISA tracks attempts to limit skating and organizes efforts to foil them. Most pro-skating campaigns, though, are powered by locals who just want to be left alone to skate. Solutions may come in the form of ordinances such as those passed in Newport, Rhode Island, where the city council voted to permit "roller skating/roller blading" on the streets, as long as skaters heed ordinary traffic signals like stop signs, traffic lights and one-way street designations.

A little self-policing may help, too. The country's largest, most active club, the 2,000-member New York Road Skaters Association, founded a Skate Patrol three years ago; its 70 red-T-shirted volunteers guard approaches to Central Park and collar "wobblers" for a free lesson. They also encourage people to wear protective gear and tone down crazier skating antics. Similar patrols have started in Boston, San Diego and Detroit.

For some skaters, the appearance of people with matching red T-shirts and Prussian attitudes about knee pads spells death for real skate culture. Knowl Johnson, 25, a personal trainer, was one of the original extreme skaters: he's been skating in and out of Central Park for eight years, longer than almost anyone. He's the best garbage-can jumper I've ever met. "The more I see 50-year-old guys waddling along on skates, talking football scores—it makes me feel like quitting," he says. Even so, Johnson recently got invited to appear on the Saturday-morning USA Network show *Blade Warriors*, an in-line reincarnation of the tacky and now largely defunct Roller Derby. Skaters compete for a $100,000 prize. Did he refuse? You bet not. "Money is money!" he says.

Youthful rebellion, danger, booming growth, mainstreaming, regulation, commercialization. Is this the inexorable course of modern passions? I like to think this one will bring something more. The last time I talked to Anthony on the phone, it was to tell him that Arlo had just been in New York to shoot his latest film. But I'd found out too late, and Arlo was already gone—we missed him by a day. Anthony was downcast. "Do you have his phone number?" he asked. But Arlo had no phone number—he was somewhere in an RV headed for Miami and the next shoot.

"Hey," Anthony brightened. "Guess what? I got my 540."

"Your 540 turn! That's great! Congratulations!"

"School's gonna be out soon. I can practice every day and get better fast."

"And get a little closer to California?"

"Yeah," he said. "California."

Anthony, I hope you make it, if you have to skate all the way.

Melding ballet dancer's grace and in-liner's brio, the skater *extraordinaire* known as "Ungie" takes a flying leap.

By Donald Dale Jackson

Daring deeds, bold dreams, in a land removed from time

In The World Beneath, *the sequel to his best-selling* Dinotopia, *author-artist James Gurney unveils a ravishing, action-packed adventure*

Only a few species, among them *Tyrannosaurus rex* (right) menace peaceable dinosaurs and human compatriots: here, a heavily armored brachiosaur, bearing convoy passengers and flanked by spike-headed *Styracosaurus* guards, rears up to confront phalanx of meat-eaters; winged skybaxes (upper left) attempt a decoy maneuver.

James Gurney has no trouble impersonating your average suburban father. He's got all the accouterments—the two young kids, the station wagon, the lawn, the affable, somewhat distracted manner, the obvious devotion to his family. He could be that nice new assistant manager at the bank or part-owner of the hardware store. You wouldn't take him for a man with an outrageous fantasy unreeling more or less continuously in his brain.

But when other fathers in his leafy, affluent neighborhood in a quiet town in New York's Hudson Valley climb into their Buicks and go to work, the 37-year-old Gurney ascends a flight of stairs to his studio and sets about creating the brilliantly imagined world he calls Dinotopia, a lost island where humans and dinosaurs coexist in peace and harmony. "I overheard one of my boys talking to another kid one time," he recalls, "and this other boy

At dino-scale Round Table, hero Arthur (seated, center) lays expedition plans before peers human and saurian.

says, 'Does your father really just draw dinosaurs all day long?' And my son says, 'Yep,' and the other boy is quiet for a minute and then says, 'How come he does that when he could be a truck driver?'"

The land that Gurney explores in his lavishly illustrated books *Dinotopia* (1992) and *Dinotopia: The World Beneath*, which appears this month, seems to be north of Jurassic Park and west of Oz. Like *Jurassic Park* author Michael Crichton, Gurney gets the science right and takes off from there. Dinotopia, shaped roughly like Australia and cut off from the outside by treacherous reefs, is shared by the multicultural human descendants of shipwreck survivors and every variety of dinosaur, from the parrot-beaked *Protoceratops* to *Oviraptor* to *Tyrannosaurus rex* himself. The saurians have their own language and traditions, even their own books, including a volume titled *The Care and Teaching of Humans.*

With the exception of testy meat-eaters, such as the tyrannosaurs, everyone gets along fine, working side by side in beautiful and ingeniously designed cities, enjoying picnics and parades and puppet shows, and settling matters of import at roundtable conferences (above) where the puny humans have to sit on stilt-legged high chairs to be level with the dinosaurs.

Dinotopia tells the story of an American scientist and adventurer named Arthur Denison and his teenage son Will, who are borne to the island on the backs of dolphins after their ship sinks in a storm in 1862. The Denisons are warmly welcomed by both the human and saurian Dinotopians and gradually introduced to their civilization. They learn the Dinotopian view of time as neither linear nor circular but spiral-like, "so time moves on but history repeats itself," and the Dinotopian code, with such precepts as "Give more, take less," "Do one thing at a time," "Exercise imagination" and "Sing every day." The Denisons tour the island, visiting wondrous Waterfall City ("a combination of Niagara and Venice," Gurney says), splendid Sauropolis ("grander than Rome") and the Rainy Basin, where the tyrannosaurs roam. Will trains to pilot a skybax, the huge winged *Quetzalcoatlus*, while Arthur gets a glimpse of a network of subterranean caves where, according to leg-

end, ancient Dinotopians fled, carrying away treasure, when their city collapsed into the ocean.

The World Beneath picks up the tale with Arthur leading an expedition by submersible to the caverns, then exploring afoot and in a marvelous ancient vehicle called a "strutter," which seems to have a mind of its own. While Will flies missions over the Rainy Basin, Arthur discovers a stone that harnesses solar power—a "sunstone"—a romantic interest, and even a new species of dinosaur (a real one; the fossil was found in South America while Gurney wrote). There's more, but that would be telling. Where *Dinotopia* is a leisurely ramble, *The World Beneath* is more of a melodrama, with a greedy sailor and the ever-ferocious meat-eating dinos providing the danger.

"My goal," says Gurney, "is to create a fantasy world as realistically as possible. I wanted to make a world that I could step inside and live in. To create a place with that kind of texture and depth is a dream I've had ever since my parents put me in a sandbox." He succeeds primarily through his sumptuously detailed and evocative paintings. Gurney is a painter first; he writes the final text only after completing the artwork, in the belief that the pictures should drive the words. His pictures combine a rich, airy feel with realistic detail; the dinosaur taxi plodding up a broad staircase in a Venice-like city looks as if it belongs there (see cover). "I was working on that painting about 8:30 one night when the boys came in to say good night. They wanted to be in the picture, and I needed something in the right foreground, so they're sitting on the steps—they got to stay up late that night."

His books fall into the elusive category publishers call "crossovers," marketable for either children or adults. *Dinotopia,* debuting with an astronomical first printing of 300,000 by Turner Publishing, was a crossover sensation. The title vaulted onto the *New York Times* adult best-seller list while still selling in many children's book departments. By this summer more than 1.1 million copies had been sold in 22 editions worldwide, a film was in development, Gurney had licensing contracts with Mattel Toys and Hallmark Cards, among others, and there was a buzz about a Dinotopia theme park—"on hold till the movie," he says.

The youngest of five, Jim Gurney grew up in Palo Alto, California, in the 1960s. His father was a mechanical engineer for Lockheed and later for the Stanford Linear Accelerator Center. "He worked in high-vacuum technology. I had this notion of a huge vacuum cleaner," Jim recalls. His father liked to draw plans for sailboats, gliders, bicycles and the like, which taught Jim that "anything is possible in a drawing." He and two brothers converted a narrow strip of telephone company land behind their house to a playground they called Yonderland. "It was filled with interesting debris, timbers and a big wooden spool I pretended was a hatch cover on a pirate ship or a hidden entrance to an underground world."

His introduction to dinosaurs was a childhood visit to a San Francisco museum. "They had several skeletons displayed, and I thought that's what they looked like, bones with no flesh; I imagined that at night the skeletons would walk around." His brother Dan, a kindergarten teacher, remembers Jim as "absorbed in his own interests and creations." He built models from scratch, as he would do later with the fanciful creations he conjured up for Dinotopia. Dan was particularly impressed with a puppet named Hiram, complete with moving parts, that Jim improvised from packing material. "He was talented in several directions," his brother remembers. "He could draw and make things, he wrote well, and he was good at math. It wasn't clear which way he'd go."

But by high school Gurney was zeroing in on a career in art. "I drew this chubby beagle we had—some of my dinosaurs look like chubby beagles—then drew whatever I saw: fishing boats, bridges, scenes on backpack

Author Donald Dale Jackson claims he once spent three weeks on Dinotopia—but promised to keep the location a secret from pesky would-be tourists.

In a studio filled with his props and models, Gurney solicits advice from sons Dan (left) and Franklin.

At outset of his adventures, hero's son, Will, nearly meets with calamity: during an experimental flight in a dragonfly-winged ornithopter, the aircraft plunges toward falls; a skybax hovering below must rescue him.

trips. I remember discovering N. C. Wyeth's illustrations, I think in *Treasure Island*, and the almost physical thrill of anticipation before turning a page." At the University of California at Berkeley, he was a Phi Beta Kappa anthropology major and an emerging nonconformist at a place where nonconformity was the norm. He got around by unicycle ("You didn't have to worry about anyone stealing it") and once wore his favorite gorilla mask when turning in his final exam for a course on primate social behavior. "Nobody looked twice," he recalls.

After graduating in 1979, he took courses at the Art Center College of Design in Pasadena. A year later, he and a fellow student, Thomas Kinkade, left Southern California by boxcar with the aim of sketching their way to New York. "We met this tramp in L.A. who told us how to avoid the security guards and how the crewmen would help us," Gurney says. "We got short haircuts and gas station uniforms with our names over the pockets, and we'd go to bars and do portraits. On a good night we'd make $100." The boxcar odyssey ended abruptly when they were booted off a train in Ohio at gunpoint.

Moving on to New York, they made a frontal assault on book publishers, trying to sell a book on how to sketch on the road, but they couldn't get past the receptionists. "We didn't have any money left, so we slept on a burned-out pier we reached by crossing a plank we pulled up at night." After refining an outline at a Burger King, they finally found a receptive publisher, got an advance, and two years later delivered *The Artist's Guide to Sketching*.

Back in California, Gurney was rejected for a job as a Disney animator before signing on as a background painter for the animated film *Fire and Ice*, his introduction to fantasy art. "I knew this was a world I could enter," he says. "I could watch scenes take place inside my paintings. I also had 11 deadlines a week." Next, he painted covers for science-fiction and fantasy paperbacks, and began to do historical and archaeological illustrations for *National Geographic*. He and Jeanette Lendino, an artist he'd met in school, were married in 1983 and moved to the Hudson Valley soon afterward.

His interest in dinosaurs flicked on and off until he combined it with the idea of lost worlds. "Dinosaurs appealed to me because of the unknowns. We don't know what they sounded like, how they moved, what colors they were. They're on that balance point between fantasy and reality, not like mermaids, say, which are pure fantasy. And 'new' dinosaurs are being discovered all the time. They've gone through waves of popularity. The interest seems to follow the science by a decade or two. In the 1970s scientists began to think that dinosaurs were more dynamic and social than had been thought. The storytellers like me come afterward. I al-

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ways had the lost world idea. I began to think about an island where people and dinosaurs live together—they're not extinct after all. Then my brother Dan suggested according the dinos their wise and gentle personas."

The idea unfolded in Gurney's ever-active imagination. He did a series of five paintings, one of which was *Dinosaur Parade,* and found a publisher for them. This provided the wherewithal to quit the *Geographic.* The late publisher Ian Ballantine, whom Jim had met through their shared interest in science fiction, helped him formulate and sell the idea for *Dinotopia.* The name evolved from a breakfast conference at home. "I always keep a pad and pencil at the table. I had the idea for an island, and I squiggled out the shape of it. Jeanette and I started playing with names. We thought of 'Archaeoterra' and 'Paleomundia,' then hit on 'Dinotopia.'"

The next problem was incorporating the self-contained paintings he'd already done into a cohesive story. One depicted Waterfall City; another, a mountaintop structure he called Tentpole of the Sky. *Dinotopia*'s episodic, meandering plot allowed him to tie them together. He did research at the Vassar College library, reading 19th-century travel journals. He interviewed paleontologists, showering them with questions about dinosaur behavior. "Most of the scientists were comfortable with the fantasy," he says. "A lot of them are big kids at heart anyway." Gurney visited a zoo to watch emus, the living animals closest to certain dinosaurs in appearance. "Most mammals move fluidly, but emus and other birds stop and hold their position, tilt their head. I think that's the way smaller dinosaurs would move."

The first phase of a Gurney book is a storyboard, a technique borrowed from animated films. He draws a small rough sketch of each of a book's 80 or so double-truck spreads with a line of description for each. At this point he knows the outline of the story but not the words. Ideas and dialogue evolve as he draws, first the sketch, then a refined pencil drawing, then oil applied directly over this. "In the early stages it sometimes feels like you're pushing mud around, but once in a while the picture seems to paint itself; you don't have to think about it, you're inside the picture listening to the music." He became so immersed in painting a canyon that when Jeanette called him to dinner, Gurney says, "I swear I heard her voice echo off the canyon wall."

He works at a drawing board next to an enormous window in a 20-by-30-foot studio over the garage. Props crowd the tabletops: Japanese-made model dinosaurs, various Dinotopian devices he whittled and patched together, cardboard architectural mock-ups, a Tibetan

An obliging kronosaur tows an underwater craft on the first leg of Arthur's journey to sunken caverns. Other kronosaurs, one frolicking inverted like a modern dolphin, and plesiosaurs (bottom, right) gambol nearby.

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Amity prevails always: this benevolent triceratops prefers life with a human companion riding astride its head.

horn ("for calling dinosaurs to breakfast"), a 19th-century dress, a helicopter gunsight he used as the strutter's controls, a glass prism he copied for his sunstone. Sound-effect CDs—rushing water, jungle noises—provide the necessary ambience. Occasionally he'll don a costume and act out a scene. "I'll pace around so much, my calves sometimes hurt at the end of the day."

He organizes his time ruthlessly. While working on *The World Beneath* he drew up a chart accounting for every hour of every day under the heading "Get It Done." The chart plotted a 52-hour work week, six days of three sessions a day—morning, afternoon, evening—along with meals, family time and "projects with the boys." His quota was ten pages (averaging a picture a page) per month. Television is absent from the home.

The Gurneys are a family package—Jeanette, the daughter of a baker, calls Jim's books "the family business." When an exhibit displaying his work opens, all four Gurneys turn up. His sons play in his studio while he paints and often pose for him. When he was working on a pageant scene for *Dinotopia* he recruited, costumed and photographed a detachment of neighborhood kids.

When he finishes the paintings for a book—an 18-month-long job for *The World Beneath*—he chases the boys out of the studio and spends three or four months writing the text on an electric typewriter. Text, pictures and captions all help the narrative along; none is complete in itself. He writes several drafts, cutting until the text is perhaps a quarter of its original length.

His spin-off Dinotopia map, which looks like a parody of a *National Geographic* map (the publisher is the "Global Geographic Society, Jaspar Wogtwaddle, President"), contains hints of stories yet untold—including dozens of shipwrecks, a reference to an early Chinese visit, an "attack by *Dunkleosteus*," and a mention of Dinotopia's original castaways, sailors blown off course on a voyage from ancient Egypt. "I have to make it up as I go along," he says. "Right now I have no idea where those will lead."

One subject they probably won't lead to is politics. Dinotopia is an apolitical isle; Gurney seems content to keep it that way. "I make no political statement," he declares, "though I think there's a sense of hope in the idea that people and animals can get along and work together." Left and right have both found solace in Dinotopia, but Gurney disavows any message-mongering.

Scientific correctness interests him more than the other kinds. A note at the beginning of *The World Beneath* states that any similarity between Dinotopian critters and creatures living or extinct "is purely intentional," and he means it. When Argentinean scientist Rodolfo Coria discovered a fossil of the largest meat-eating dinosaur yet known while Gurney was writing *The World Beneath*, Gurney hurried to New York to meet the scientist, learned that Coria and his daughter had admired *Dinotopia*, and gained permission to use the new species' scientific name, *Giganotosaurus*, in the book. Gurney, being Gurney, introduced several *Giganotosaurus* characters, dubbing one of them "Stinktooth."

Gurney seems outwardly unaffected by his success. Though he moved into a spacious house on nine wooded acres a year ago, he remains a low-key homebody, dividing time between work and family. His main reaction to *Dinotopia*'s phenomenal reception was a desire to show with his second book that "it wasn't a fluke. The biggest kick is seeing a finished book on the shelf. A librarian I met told me that they had to buy a fourth copy. I thought they were being stolen, but she told me they were getting worn out from overuse." As to what's next, there is already a file of notes for five or six more Dinotopian adventures in a drawer beneath the Tibetan horn.

Whatever new exploits Gurney dreams up, it's safe to assume that he will adhere to an old Dinotopian adage he recently discovered: "If you don't grow up by age 35, you don't have to."

In Dinotopia, pageantry and compassion intertwine: maidens seeking a cure for an ailing dino hatchling join twilight procession through the Garden of Hope.

In Small Town, U.S.A., everyone is a somebody

Photographer Dennis Kitchen traveled from Alabama to Wyoming taking portraits of the least-populated towns in each state

"When a small town gets so small that a photographer can round up all of its residents and get them into one close-up picture, you have a town small enough to be the punchline of a joke. As in the famous 'My town was so small that nobody bothered to use their turn signals because everyone knew which way you were going anyway' type of joke. In a town this small, you have to learn to laugh at yourself: there is nobody else to do it for you."

So writes Garrison Keillor in his introduction to *Our Smallest Towns: Big Falls, Blue Eye, Bonanza, & beyond,* a work by photographer Dennis Kitchen, published by Chronicle Books. In his panoramic group photographs, Kitchen captures what Keillor lovingly portrays in words.

An urban New Yorker, Kitchen is fascinated by people who choose to live in tiny, isolated places where no one is anonymous and everyone is important. Starting at the U.S. Census Bureau, he located the least-populated incorporated place in each state—such towns can usually levy taxes and establish a government. For four years he photographed the residents and interviewed them about how they make their towns work.

Kitchen's interest dates from childhood visits to his grandfather in Argusville, North Dakota (pop. 161). "My grandpa had been mayor for years," recalls Kitchen. But he was also in charge of public works. "Once a year he would hook up the grader and climb aboard his tractor and level off the eight gravel roads that ran through town."

For city folks it is a comfort that there are still places where everyone is known. "As isolated as their towns seem to be," Keillor writes, the people are ". . . apt to feel more connected to things than, say, a New Yorker does, who would hardly dare dream that he or she could make a big difference in the city, whereas in a one-dog town, every time you mow the grass, it's urban renewal."

Marlane A. Liddell

Victory, Vermont
Population 28

The Old Schoolhouse is used only once a year for a town meeting, since the few school-age children attend classes in nearby towns. The school budget is so tight, according to one resident, that if a family with children moved to town "we'd have to raise everybody's taxes. That's why we try to discourage anyone from moving here."

Hoot Owl, Oklahoma
Population 0

Hoot Owl was incorporated in 1977 by a family that later defaulted on payments to the bank. When photographed two years ago, the town was up for sale, and the population was zero. The new owner uses Hoot Owl as a family retreat—the population has exploded to 5. The town borders Lake Hudson for 3,000 feet.

White Rock, South Dakota *Population 6*

White Rock was founded in 1884 and named after a rock that was dynamited there in 1899. In 1984, to raise money for the centennial celebration, townspeople went to the blast site and dug up pieces of the original rock. Mayor Jerry Olson (far left) recalled how they poured pebbles into plastic key chain ornaments and sold them for a dollar each, using the proceeds to pay for a new white rock "lite"—made by welding iron rods together and painting them white. Fate has been unkind since this photograph was taken: Mayor Olson perished in a car accident, and his wife died last spring. The young family of four is no longer together; only the father (fourth from left) remains in White Rock, constituting the town's current population of one.

Ismay, Montana
Population 20

Ismay was founded in 1909 by a railroad president and named for his daughters, Isabelle and Maybelle. But during every football season since 1993, the town has changed its name to Joe, in honor of Joe Montana, the gridiron great. A sign in town reads "Welcome to Joe, Montana." A former town clerk tells about a letter he received from a woman in New York shortly before the town's 1984 diamond jubilee celebration: "We are planning a trip to Ismay because my mother was born there." She asked about big hotels and fine restaurants. The town clerk called her and explained that the nearest hotel was 200 miles away and there were no restaurants. The visitors showed up anyway and had such a good time that they've been back twice.

By Jay Stuller

There never was a harder place than 'the Rock'

Used for 29 years to house the nation's worst criminals, the penitentiary on Alcatraz earned its reputation as 'Uncle Sam's Devil's Island'

It takes just a gentle pull on a lever to close 14 of the prison's cells at a single time. In a mere three seconds each door, 250 pounds of hardened steel bars, comes shut and locked with an explosive crack of metal thunder. Perhaps the most intimidating sound in the history of American justice, the very definition of "slammer," it's a signature of the U.S. Penitentiary, Alcatraz.

From 1934 to 1963, Alcatraz housed gangsters, kidnappers and killers, reputedly the toughest, most hardened and most incorrigible federal convicts in America. Used as a threat against convicts in other federal pens, it took only criminals who couldn't follow rules elsewhere. Alcatraz subjected them to a regimen meant to control rebellious ways and crush their very souls.

On a Saturday night in early March, the prison's population is composed of 20 rather unhardened Boy Scouts and their 7 adult guardians; they have earned the chance to serve a little time thanks to volunteer work on the island. Now part of the Golden Gate National Recreation Area, Alcatraz is managed by the National Park Service. The penitentiary's worldwide notoriety attracts more than a million tourists annually.

Ostensibly escape-proof, it was once known as "Uncle Sam's Devil's Island" and "Hellcatraz." For convicts, the concrete-and-steel cages of "the Rock" were hell on

Robert Stroud, the "Birdman of Alcatraz," spent 11 years in an isolated cell in the prison hospital.

Surrounded by a thick fog, the U.S. Penitentiary at Alcatraz looms above the waters of San Francisco Bay. The cellhouse was completed in 1912, when the island was still being used as a military fortress and prison.

Earth. The sublime views of San Francisco and a bay full of ships and sailboats only added to inmate despair. Thirty-two years have passed since the last real convicts shuffled off the island in shackles. And despite spooky stories gleefully told by Ranger Lori Thomsen—the Park Service "warden" who's leading this adventure—there's not a single sign of ghosts.

While sitting in cell C-109, however, on a thin and narrow mattress that rests atop the bed frame's interwoven steel slats, one is given serious pause. At 5 by 9 feet, less room than many animal shelters allow a dog, the cell seems even smaller. Painted in white and two shades of putrid green, the concrete feels cold against one's back. A bare bulb saturates the space with harsh light.

It's obvious that a man would have come to know every bump on these horribly intimate walls, that patterns in the ceiling would remain in the mind's eye long after the lights went out. In the darkness of the Alcatraz that was, an inmate is alone. Yet the night is not still.

Restless bodies turn in other cells. The muffled engine from a passing boat crescendos and fades. Dancing across the water on gusts of wind are the taunts of San Francisco: horns, sirens, and even female laughter from the St. Francis Yacht Club just a mile away. And then there are the birds.

A seasoned con might sleep through the periodic outbursts of roosting gulls and herons. But for a new "fish" on Alcatraz, the sudden squawks would rudely break an uneasy slumber. And while no spectral shades of deceased convicts are floating about, at 2 A.M. in a tiny cell the Rock sure has a way of giving one the unholy creeps.

With 22 acres of windswept sandstone and no fresh water, the barren island simply wasn't suited for settlement. Alcatraz was left untouched until the early 1850s, after the United States acquired California from Mexico. American military engineers figured the island would make a fine fortress for guarding the strategic harbor through which passed so much gold. Armed to the teeth during the Civil War, the garrison fired only once in earnest, at an unidentified ship. They missed.

Pressed into double-duty as a makeshift military prison, Alcatraz held soldiers guilty of desertion or other crimes. Later, the prison even housed American Indians, including one of Geronimo's men. At the turn of the century, overwhelmed by U.S. Army prisoners and convalescents from the war in the Philippines, the military decided to build a new cellhouse. Completed in 1912, the three-story structure of reinforced concrete is still—next to the Alcatraz lighthouse—the island's most prominent building. By 1933, however, the mili-

Photographs by Regis Lefebure

Alcatraz's first warden, James Johnston, once lived in this building; fire and vandals later destroyed it.

Frank Morris (center) and John and Clarence Anglin spent six months planning their legendary 1962 getaway.

tary took a look at the high cost of maintaining Alcatraz and prepared to close it.

J. Edgar Hoover, the aggressive young director of the FBI, had other ideas. A crime wave in the 1930s changed public attitudes toward the treatment of lawbreakers. A master at raising the FBI's profile, Hoover did little to quell the celebrity surrounding "public enemies," such as Al Capone and George (Machine Gun) Kelly, even as his G-men tracked them down. Yet the gangsters had caused problems for federal prison wardens. Pushed by Hoover, U.S. Attorney General Homer Cummings agreed on the need for a "super prison." They chose Alcatraz, and James A. Johnston to run it.

A lawyer, banker and civic leader, the 60-year-old Johnston seemed an odd choice. Yet he had experience; two decades before, California's governor had asked him to take over the barbaric Folsom Prison. By abolishing striped uniforms and corporal punishment, Johnston earned a reputation as a humanitarian reformer. But the times—and the man—had changed.

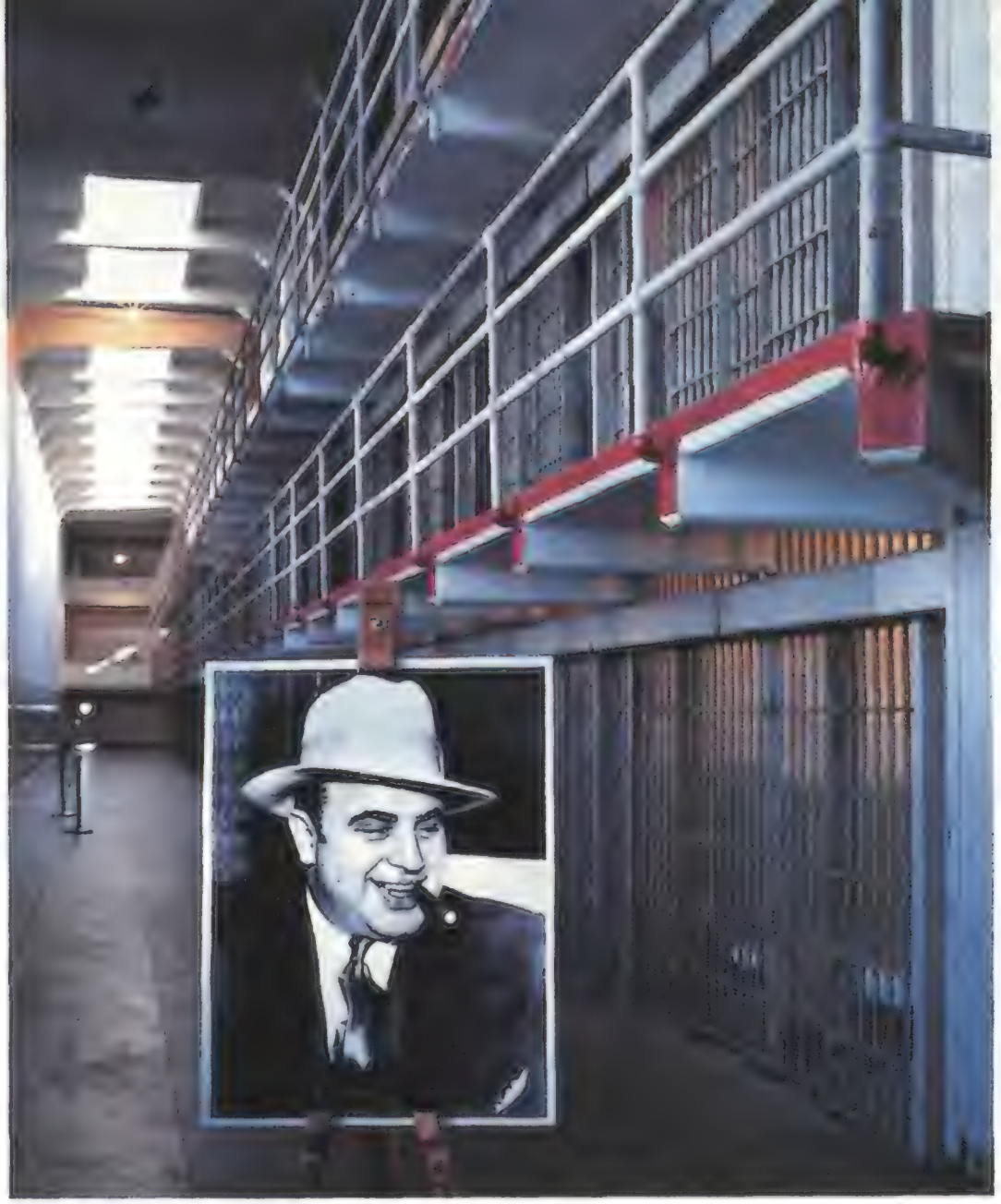
Under Johnston, Alcatraz bore the imprint of Frederick Winslow Taylor, the so-called "father of scientific management," whose time-and-motion studies made American factories models of efficiency. Prisons had always been places of rules and rote procedure, but Johnston pushed penology into the realm of mad science.

Each day began at 6:30 with a loud clang from the cellhouse alarm, followed by the day's first official count. Convicts had 20 minutes to brush their teeth, make their beds and get dressed. Marched down the 300-foot-long corridor that inmates called "Broadway," the men entered the dining hall.

Given 20 minutes to eat, convicts stood at the shriek of a whistle. Their utensils were counted, and the men were marched back to their cells for another official count. The same drill prevailed at lunch and dinner. Walks to the workshops—where convicts made gloves and pallets, and washed laundry—meant passing through metal detectors, or "snitch boxes"; strip searches and shakedowns were random and frequent. At 5:30 the cell doors closed a man in for the next 13 hours. The lights went out promptly at 9:30. On foggy days—when the tower guards did not have a clear line of fire—the men weren't let out except for meals.

"An hour, a week, a month meant nothing," says former Alcatraz convict Nathan Glenn Williams. "A year only served to indicate you were 365 days closer to release. For those who were serving interminably long

Chipping through their cell vents, they climbed into a corridor, like the one above, and out through the ceiling.



Gangsters like Al Capone (inset) no longer lived the "soft" life once they were transferred to Alcatraz.

sentences—such as 150 years plus natural life—even the calendar lost its meaning." Another ex-convict called the machine-like routine "an exquisite form of torture."

On three of the prison's quartet of freestanding, three-tiered cellblocks, Johnston replaced the key-opened doors of soft strap iron with bars of tool-proof steel. He installed the then novel locking system. The heavy-metal slam was indeed intended to intimidate, to remind prisoners that the guards were in total control.

With 336 remodeled cells available, most convicts were kept in B and C Blocks, split by Broadway. D Block, the "Treatment Unit," was used for segregation. Six cells in D Block had solid-metal doors; doing time in "the Hole" meant as much as 19 days spent in solitary confinement in one of these six cells, often in total darkness.

Johnston built elevated gun galleries at each end of the cellhouse. From behind bars on the narrow walkway, guards could see the prisoners at all times. A series of electronically controlled gates and doors secured the cellhouse entrance. In the ceiling of the dining hall were tear-gas canisters. Barbed wire topped a cyclone fence that encircled the prison. Signs went up warning boats to stay at least 200 yards from the island.

Most penitentiaries had one guard for every ten convicts; Johnston hired one for every three Alcatraz prisoners. He ordered 12 official "counts" per day, but random and unofficial tallies could push the daily total past 30. Even if a man got past the guards and man-made obstructions, he still faced a formidable natural barrier—the cold waters and swift currents of the bay.

No man was directly sentenced to the island. He "earned" his way there if he was disruptive, threatening or posed a security risk at another federal pen. A convict also earned his way off, but only back to another federal prison. The idea was that no one would be paroled directly from Alcatraz. A prisoner could depart by way of the morgue, but it was said that even dead men left the Rock in handcuffs and shackles.

In the early years, new arrivals were showered and strip-searched, the first step in deflating egos. "I never saw a naked man yet," Johnston later said, "who could maintain any sort of dignity." At their cells, prisoners were issued plain coveralls. "You are entitled to food, clothing, shelter and medical attention," Johnston told the prisoners. "Anything else you get is a privilege."

Books and magazines were censored, vetted of any item relating to crime. An inmate could write and receive letters, yet these too were heavily censored and

The lighthouse on Alcatraz stands tall over the San Francisco skyline when seen from the roof of the main cellhouse. The stately tower was built in 1909 to help ships avoid disaster in the bay's treacherous fog.

sometimes not even delivered. Time in the recreation yard—where inmates played softball, chess and dominoes—was limited to a couple of hours on weekends. Convicts could work in the kitchen or in one of the prison shops, but Alcatraz had no commissary in which the men could spend their paltry wages.

With good behavior, convicts were allowed a single one-hour visit per month. This offered small comfort, for the inmate and visitor could see each other only through a thick plate of glass and were forced to talk through a telephone. Guards monitored conversations and quickly cut off discussions of current events, prison conditions and criminal activities.

Any and all "privileges" could be taken away for the most minor transgression. In the first few years of Warden Johnston's reign, that included talking to other inmates. Take a swing at a guard and you might get three weeks in the Hole. Legend has it that some convicts were confined to the cellar of the old military fort, in spaces as dank and dark as any medieval dungeon.

It didn't take long for the routine—and especially Johnston's edict of silence—to drive convicts stir-crazy. While locked in solitary, a counterfeiter named John Stadig bent a prong on a fork, pried a vein out of one wrist and bit it in half. He was stopped in the midst of digging out a vein on his other wrist. In 1937 Arkansas bankrobber Rufe Persful got hold of a hatchet in an Alcatraz workshop and promptly chopped the fingers off one of his hands.

Word of the self-mutilations began to leak. The Bureau of Prisons treated Alcatraz as if it were top secret, which only fueled media curiosity. Paroled inmates were speaking out. One, William Ambrose, told the *San Francisco Chronicle*: "The 'no talk' rule is the hardest thing in Alcatraz life. It's the toughest pen I've ever seen. The hopelessness of it gets to you."

In a 1938 issue of the *Saturday Evening Post*, former inmate Brian Conway claimed that during his last year on the Rock, he knew of 14 convicts who'd gone violently insane. Over 29 years, five men committed suicide on Alcatraz. After his release, Roy Gardner wrote a book called *Hellcatraz: The Rock of Despair.* He called it an "island of the living dead."

In 1941 Henry Young, age 29, went on trial in San Francisco for the murder of another Alcatraz convict, Rufus McCain. He expected a first-degree murder conviction. But his attorney put Alcatraz in the dock, claiming that repeated beatings by guards and solitary confinement had put Young into a "psychological coma," which made him "legally unconscious" during the

Author Jay Stuller is currently at work on the book Hear Them Roar: A Man's Guide to Managing PMS, *which he hopes will keep him from being incarcerated.*

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Leon (Whitey) Thompson, who endured four years in an Alcatraz cell, looks out through a visitation window.

Theodore Cole and partner broke out of this prison workshop in 1937; both were presumed drowned.

killing. Fellow convicts, brought to the courthouse in shackles, testified to the prison's systematic brutality. Newspapers nationwide carried stories citing "the trial of Alcatraz." Young's attorney said in closing arguments, "It was Alcatraz that killed McCain. It was the cold, sadistic logic that some men call penology that killed him."

The jury agreed, finding Young guilty only of involuntary manslaughter. Political pressure converged on the prison. But that December, the Japanese bombed Pearl Harbor, and Americans suddenly had more pressing concerns than the treatment of federal convicts.

The first con to make a break for it was Joseph Bowers. In 1936 he clambered up a fence in full view of guards and was shot dead; other cons called it a suicide. In 1937 Ralph Roe and Theodore Cole made it off the island; never again seen in public, they were presumed drowned. No matter, virtually every convict on Alcatraz spent much of his time figuring out ways to escape.

From shops, the dock and maintenance areas, prisoners pilfered anything that could be used to cut through bars or dig into concrete. Tied to pieces of string, a small blade might be hidden down a sink's drainpipe or in a toilet; some are no doubt still hidden on Alcatraz. Inmates also memorized the routines of guards down to the second. But always, ultimately, there was the water.

San Francisco Bay could douse the most fevered desire for freedom. Floyd Hamilton, once a swaggering Public Enemy No. 1, made it to the water and disappeared. A manhunt failed to find the escapee. But Hamilton couldn't bring himself to swim off. He hid in sea caves eroded into the island sandstone. Finally, hungry, weary, cold and wet, Hamilton snuck back into a prison storeroom and fell asleep while awaiting capture.

An attempt to "blast out" of the Rock

A few didn't give up so easily. In 1946 a half-dozen convicts led by Bernard Coy and Joseph Cretzer managed to seize weapons from a guard. They intended to "blast out" but were unable to get out of the cellhouse. The convicts controlled it for two days. While the Coast Guard and Navy circled the island, thousands of spectators watched from the city as guards mounted an assault. Marines also volunteered to lay siege to the cellhouse, their grenades bursting against its sides in puffs of pulverized concrete. They climbed to the roof and dropped more grenades through vents and skylights. Terrified cons hid behind mattresses in their cells.

Cretzer pointed his gun at a group of guards held hostage in two C Block cells and began firing. Miraculously, only one of the officers died, but several more were seriously wounded. By the end of the siege, Cretzer, Coy and Marvin Hubbard were dead from either bullet wounds or grenade blasts. Two of three surviving ring members were later executed at San Quentin.

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Former Alcatraz inmate Nathan Glenn Williams stands in front of the cell that he occupied for six years.

Johnston's successors loosened the rigid routine. In the mid-1950s, cells were equipped with headsets that played radio programs. Convicts were supplied with paints and canvas, and many turned to art to kill time. Still, escape remained a compelling urge.

The most fabled Alcatraz getaway involved Frank Lee Morris and brothers John and Clarence Anglin. In 1962, using pilfered tools, they chipped through vents in their cells and replaced the grates with cardboard replicas. With lifelike dummy heads placed in their bunks—to fool the guards during nighttime counts—they climbed into a utility corridor in the middle of B Block, went up to the ceiling and painstakingly cut through the bars of a vent. They made an inflatable raft from stolen raincoats. The preparations took six months.

On the night of June 11 the trio exited through the roof, climbed down a drainpipe and got away. Prison officials found personal effects belonging to the convicts floating in the bay, but no bodies. If the three made it, they apparently never pulled another crime. Television accounts of the break and movies such as Clint Eastwood's *Escape From Alcatraz* keep speculation on their fate fresh. The Bureau declared them dead. Others think—or want to believe—that the Anglins and Morris are still alive and free. It's part of the Alcatraz legend.

Popular perceptions of the Rock's most legendary prisoner are a mismatch with reality. At the federal pen in Leavenworth, Kansas, where he was sent for murdering a man in Alaska, Robert Stroud turned himself into an expert and writer on bird diseases. Many considered him a genius—and a psychopath. Transferred to Alcatraz in 1942 for killing a prison guard, Stroud was disliked by guards and inmates alike. He spent 17 years segregated in D Block or in an isolated cell in the prison's hospital. At Alcatraz, he wasn't allowed to keep birds.

But Stroud's biographers figured that a book called *The Bird Doctor of Leavenworth* didn't have much marketing zing. *The Birdman of Alcatraz*, made into a 1962 film starring Burt Lancaster, captured the public's imagination. To the chagrin of guards at Alcatraz, Lancaster portrayed Stroud as a gentle man.

The pressure of dealing with such men proved hard on correctional officers. Cold winds ripping through the Golden Gate made a night in a tower most unpleasant. The same went for an eight-hour shift in a gun gallery; the narrow corridor between a solid wall and a row of bars was as confining as a cell. There was high turnover among the officers.

Yet for some it was their most interesting assignment, particularly those who lived in island apartments and cottages with their families. In her book *Eyewitness On Alcatraz*, Jolene Babyak, the daughter of an associate warden, describes her childhood as delightful. "Islanders quickly saw advantages to their lives," she writes. "Children were safely tucked away from busy streets, in a neighborhood where everyone knew everyone else."

Why lock your doors on Alcatraz?

The children commuted to school on the boat *Warden Johnston*, which made dozens of trips to San Francisco daily. They played on the old Army parade ground, and mothers often didn't even lock the doors at night. No burglar in his right mind would hit a house on Alcatraz.

Yet Morris and the Anglin brothers—among 36 men who risked their lives in 14 separate attempts—had shown that Alcatraz was not really escape-proof. Nor was it cost-effective. The prison's 336 cells held an average of 260 convicts at a time; during its history the prison housed a total of only 1,576 inmates. (Today's federal prison population is 89,000.) By the early 1960s, the $13 a day it took to keep an inmate on Alcatraz made it the most expensive prison in the federal system. To fix the crumbling buildings would cost $5 million. Attorney General Robert Kennedy ordered the Rock closed.

On the morning of March 21, 1963, Olin G. Blackwell, a languid Texan who'd spent two years as warden, had only 27 convicts left. Alcatraz served its final breakfast: dry cereal, bowls of steamed whole wheat, scrambled eggs, fruit, toast, butter and coffee. Afterward, convicts were released from their cells for the last time. In handcuffs, leg irons and waist chains, they were led down Broadway, single file.

The last inmate to enter Alcatraz, No. 1,576, now had the dubious honor of being the final convict to leave.

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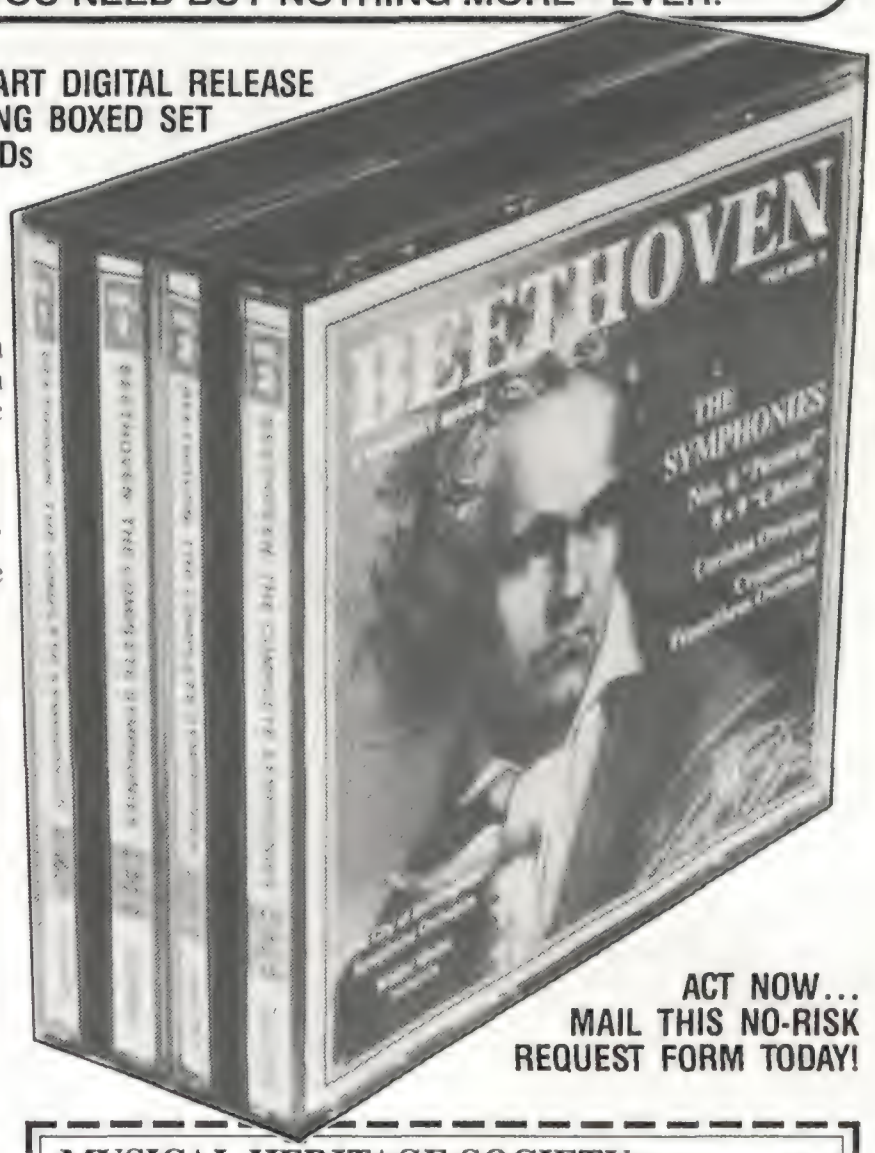
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Park ranger Lori Thomsen displays "shiv," homemade knife used by a prisoner, to a group of youngsters.

Blond and lean, 29-year-old Frank Weatherman hobbled down the gangplank, then turned to the media. "All of us are glad to get off," he muttered. "Alcatraz was never no good for nobody."

Maybe so. But among the media contingent was a newsreel photographer named Les Thomsen. Like other newsmen, he was intrigued with Alcatraz. It was an interest he passed on to his daughter. Lori Thomsen (above) has spent her eight-year Park Service career on the island. She's interviewed 15 former inmates and numerous guards, and even tours other prisons while on vacation. "I guess I'm just fascinated by them," she says.

While visitors typically are interested in the prison, the rangers treat all periods of the island's history as equally important. The Civil War era is given display space, as is the 19-month occupation by Native Americans that began in 1969 when protesters sought to establish a school and a cultural center on the island.

When Alcatraz opened for public tours in 1973, the Park Service figured the interest would last only a couple of years. Today, in the summers, tour boat operators turn away about a thousand would-be visitors per day; 4,500 visitors is the maximum permitted. "The million we get each year is about all the resource can bear and as many as the staff can manage safely," says Thomsen.

It's tough to beat a Thomsen-guided night on the island. After the last boat has departed, she leads the Boy Scouts through the tunnels under the exercise yard, into the gun galleries and through the prison's hospital. Next comes a collection of shivs confiscated in another federal pen. For the wide-eyed boys she pantomimes how convicts stuck them into the livers of other inmates marked for death. She also takes the group to the cellhouse roof to see the vent through which the Anglins and Morris escaped.

On the Sunday morning after Thomsen's tour, an Alcatraz celebrity ambles off the first boat. White-haired and nearly 80, Nathan Glenn Williams certainly doesn't look like a bankrobber. But from the late 1930s through the early '50s he was an accomplished practitioner. From an affluent family in eastern Washington State, Williams knocked over banks throughout the United States. Caught, convicted and sentenced to a state prison in Washington, he got out thanks to connections. Williams married and had a daughter but couldn't stay straight. Caught once more, he landed at McNeil Island Federal Penitentiary near Tacoma and in 1953 earned his way to the Rock.

Eventually he lost his wife and his daughter, who was adopted by a family member. Williams spent six long years on Alcatraz, where he witnessed two of the island's eight murders and a brutal stabbing.

But Williams did not change his life because of Alcatraz. "I really don't have anything good at all to say about this awful, awful place," he explains. Yet after his release from prison in 1963, Williams created a volunteer agency to drive the families of prisoners to visit inmates at McNeil Island. He embraced his past, gave lectures to youth and civic groups and was reunited with his daughter. In 1980 he was given a Presidential pardon by Jimmy Carter. Several years later he was honored for his volunteer work by President Ronald Reagan and had lunch with him. And Williams, like ex-inmates Leon (Whitey) Thompson and Jim Quillen, wrote a book about his experiences; his is aptly titled *From Alcatraz to the White House.* Once a month he makes the trip down from Seattle to the Rock, where he enjoys talking with tourists and leading tours.

When asked about the sounds that give one the unholy creeps, Williams recalls, "Well, at first the old foghorns would drive you crazy. But you got used to 'em. The same goes for the noises from other convicts." And the seagulls? "Jeez, I haven't thought of them in years," says inmate No. 1103. "There was a lot to despise about the place. But I really hated those damn birds."

He no longer hates his former guards. "There was a time when I would have killed any one of them in an instant," he says. "We have such different perspectives. They went home, had a drink and got to enjoy their families, while us convicts were locked in a small cell. But some of those men are now my closest friends. They eat dinner at my house and stay the night. Way back when, I'd have never dreamed of such a thing."

George (Machine Gun) Kelly was incarcerated in Alcatraz's cellhouse after a conviction for kidnapping.

By Neal Singer

Chimney sweeps are plunging into their work again

With more of us using fireplaces and modern high-efficiency wood stoves, the ancient profession is getting a new lease on soot

It occurred to me I should be singing, dancing and waving my top hat, up there alone on the slanting roof of the old house near Lexington, Kentucky. But it was 13 years since I had made my living as a chimney sweep, and what I noticed instead was that it seemed quite a long way down to the asphalt driveway below.

Jeff Gitlin, the agile chimney sweep whom I was visiting, had just descended a nearly vertical ladder that protruded only a rung above the roof's edge. He had grabbed the top of the ladder and in a single, confident move, pivoted, turning his back to the drop, and reached with his leg to put his weight one rung below the roof edge. This pressed the ladder securely against the roof, and Gitlin stepped quickly down.

Once, I could do this maneuver without thought. But now I hesitated. I looked up. There was only the overarching sky, with a few birds, gray cloud cover and the pale disk of a December sun. Stillness. I breathed deeply. Roofs, in a way, are as isolated as mountain peaks. Being alone on them is one of the pleasures of working the trade.

Feeling momentarily confident, I walked down the sloping roof to the ladder. I pivoted gingerly and put my free foot on the rung above the roof. This was far easier to reach than the rung below, but it turned the roof edge from a stable support into a fulcrum. If I leaned too far forward, the ladder's bottom could shoot out from under me. Leaning back, of course, could topple the ladder.

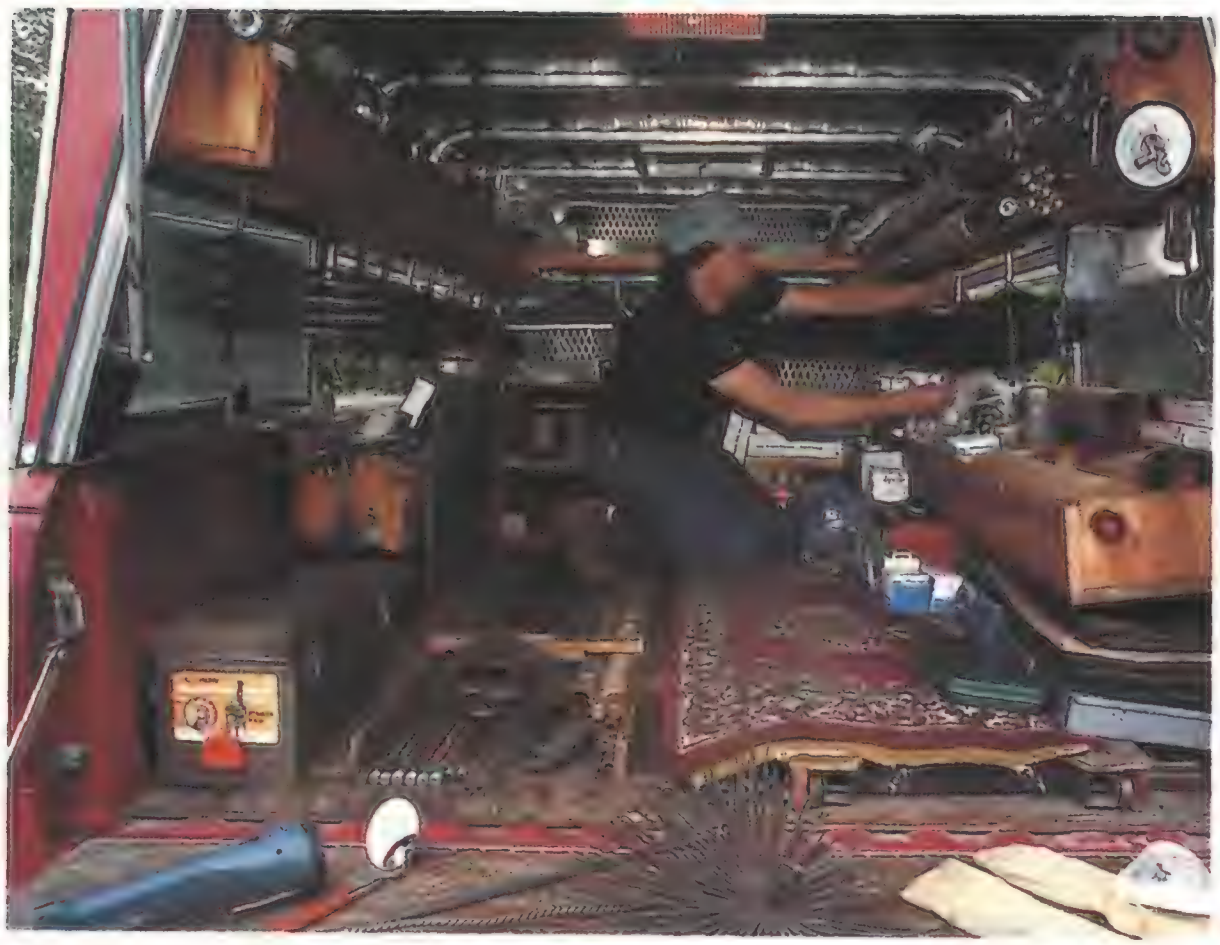
I needn't have worried. Gitlin—a safety technician who takes no chances—had affixed a C-clamp, a metal clamp shaped like the letter, so that it held the ladder to a sturdy rain gutter during my descent.

Below, Gitlin poked his head into the camper shell of his pickup truck, which was enlarged so that he could move easily within it without upsetting his neatly stacked brushes, scrapers and rods. At least three decals on his truck proclaimed him a member of the National Chimney Sweep Guild; another read, "Soot Happens."

An educational brochure published by the Chimney Safety Institute of America states that fireplaces from floor to fluetop are "far from the passive black holes most people assume them to be." Chimneys need attention and can be dangerous if they don't get it. Nevertheless, during the middle third of the 20th century when homeowners replaced wood and coal burners with gas, oil and electric furnaces, chimney sweeps faced near extinction. Then came the Arab oil embargo and a switch to efficient wood-burning stoves—and all the hazards that go with them. As a result, the profession was reborn, and today 6,000 to 8,000 sweeps, from part-timers to owners of million-dollar businesses, practice the trade.

While airtight stoves and other devices are superior to open fireplaces in producing heat and reducing airflow to prolong a fire's life, they have drawbacks. They generate cooler smoke that tends to rise more slowly through the flue, allowing flammable gases to turn to liquid cre-

Bottoms up: a German sweep (opposite) attacks a chimney from the top down; Kentucky sweep Jeff Gitlin (above) inspects the innards of a fireplace.



An enlarged camper shell covers Jeff Gitlin's pickup truck, providing storage for the tools of his trade including brushes, scrapers and mirrors.

osote before the smoke carrying them has cleared a chimney or stovepipe. If the airflow in a stove or fireplace insert (a stove that fits inside a fireplace) is closed down too soon, or if sappy wood is burned, sooty creosote will collect quickly. If ignited, this residue burns at dangerously high temperatures.

Tackling these problems is a mission of "Sooty Bob" Daniels, president of Copperfield Chimney Supply. At a sweep convention in Sturbridge, Massachusetts, last winter, Daniels, a former sweep himself, exhorted the assembled: "What other part of the house has been neglected for so long? Chimneys. Fifty million chimneys! Over ten million that need to be relined!" He held his hands up to his ears as though he were dizzy with the prospect. "America has awakened to us. We are all on the verge of being overnight successes beyond our wildest dreams!"

Jeff Gitlin's own wake-up call came in 1976.

The son of a plumbing and heating contractor in Monticello, New York, Gitlin graduated from college with a degree in industrial relations and labor economics in 1970. No jobs were readily available, so he went to Kentucky to visit a friend and stayed to become part owner of a health food restaurant.

He bought one of the first airtight wood stoves, installed it in his cold and drafty rented house—"Wonderful, I was living in the tropics in the middle of winter"—and two months later suffered a chimney fire at 3 A.M.

Chimney fires are dangerously hot fires that roar in the flue or pipes of a fireplace or wood stove, rather than where they belong—in the firebox. They begin when a particularly hot spark ignites the sooty, crusty or even tarlike creosote that has coagulated in the venting system. In a stove, the large volume of air sucked through to feed the voracious blaze can cause vibrations that blast apart unsecured joints of stovepipe, sending hot flames shooting out either end of a blown-out pipe section as it rolls around a living room. In a fireplace chimney fire, the extraordinarily hot sparks, shooting ten feet high out of the chimney like a Roman candle, can start fires on nearby roofs. More insidious, the fire can wreck a chimney unnoticeably by damaging the mortar or cracking the flue tile inside, leaving a space for sparks to pass into the attic or lodge in roof beams. If the fire doesn't destroy the tiles, a naive fire department may by hosing cold water down the very hot chimney. The sudden temperature change can crack out sections of tile—not to mention the mess the water makes in the house.

Improper venting also plays a role in chimney fires. A stove vented through a cover plate that seals off the mouth of a fireplace can cause problems. In this arrangement, smoke goes through a hot stovepipe into what amounts to a cool holding tank. Creosote is precipitated by the sudden cooling, and soot collects instead of rising. Three-eighths of an inch of sooty creosote is generally considered a fire hazard. But I have seen fluffy, black soot six inches deep, with stalactites like those in caves, behind such sealed-off fireplace mouths.

Gitlin's own chimney fire came as a surprise. "I realized there was very little information about these stoves and their technology," Gitlin said. "Nothing in the consumer literature suggested such frequent cleaning would be necessary. I saw it as an opportunity." His insight and nearly two decades of work as a sweep have earned him a glass-fronted, energy-efficient two-story house on 16 acres of rolling Kentucky pastureland. "I never took a vow of poverty," he said, looking at the small boat he keeps in his garage. "I work hard."

The owner of the small estate we next visited wanted to know if the chimney needed cleaning, and Gitlin had carried his stepladder onto the roof to examine it. Inspection was difficult because someone had attached a cap to the chimney's top.

A chimney cap—often just a metal plate supported by four angled metal strips and surrounded by wire mesh—

Neal Singer lives in Albuquerque, New Mexico; he is a science writer at Sandia National Laboratories.

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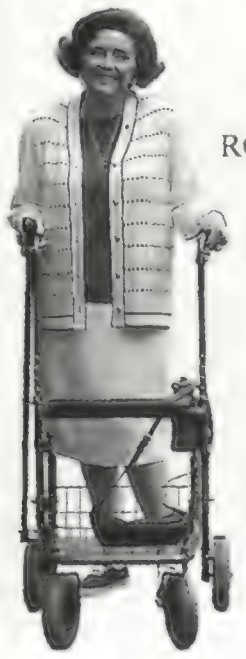

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usually is installed to prevent animals from making a home in a chimney. In some cases, specially designed caps can be useful in overcoming downdrafts, which are caused by cold winds that careen over tall houses nearby and dive into the thinner warm air of a low chimney, forcing the smoke back. Caps also can be used as umbrellas to divert rainwater, which otherwise can mix loose chimney mortar and particles of soot into a gray-black soup that occasionally ends up on the floor of a fireplace—and on adjacent rugs. A "smoke shelf," a ledge directly beneath the chimney flue and behind the fireplace damper in almost every masonry chimney, can hold a small amount of rainwater until it evaporates.

The cap blocking Gitlin's inspection wouldn't lift off. Someone, probably an amateur, had put it on with sealant instead of bolts or a metal strap. Its top wasn't hinged, either. The structure

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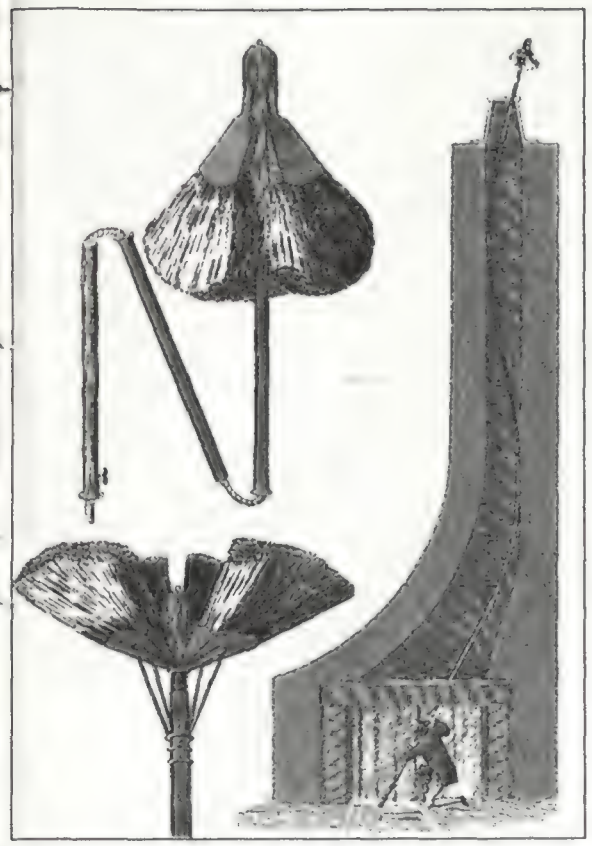

Rammed up a chimney furled, Smart's brush unfurled to scrape down soot.

prevented Gitlin from looking all the way down the dark flue. To solve the problem, Gitlin produced from his pocket a small mirror on an extendable shaft. He held it above his head so that it reflected a narrow beam of sunlight into the chimney. Looking inside, he rendered his verdict: the chimney was unlined; that is, it had no column of two-foot-long clay flue tiles within which smoke could pass but was built only of brick and now-decaying mortar. It was too clean for Gitlin to sweep but, without a liner, possibly not safe to use; sparks could get through cracks in the hundred-year-old mortar and lodge in a roof beam. The fireplace was used so seldom that Gitlin recommended that the owner simply stop having fires, rather than go to the considerable expense of having the chimney lined.

Some people assume that sweeps are just a bunch of ex-hippies, and in fact Jeff Gitlin's blue-and-white-striped railroad cap, wavy hair, wire-rimmed glasses and brush mustache make the small, lean man look somewhat like an earlier incarnation of Bob Dylan—a singer whose albums Gitlin collects. Gitlin thinks the "hippie" assessment might have fit sweeps in the early 1970s, when oil shortages generated a return to renewable fuels. To service the variety of wood-burning appliances entering the marketplace, who better than counterculture people who believed that "natural" and "renewable" were best?

"Chimney sweeping fit in with alternative lifestyles," said Gitlin. "At the time, there were no professional chimney sweep organizations, no accreditation, just top hats and *Mary Poppins*. It was right after Woodstock. A sweep could arrive in a truck with each of its parts a different color."

According to Jay Hensley, editor and publisher of *SNEWS (The Chimney Sweep News)*, Tom Risch practically birthed the modern sweep profession after he put together a startup package that included his specially designed vacuum and assorted brushes. When *Mother Earth News* mentioned his franchise in a story on sweeps, Risch became an overnight success. Said Hensley, "He started wearing a coat and tie, he flew to Paris and he drank good wine."

I myself took up the chimney brush—the chimney sweep's distinctive cleaning tool that looks like a collection of cat's whiskers done in metal—in 1978 shortly before my wife and I had our first child. I was finishing my doctorate and needed to be able to work my own hours so I could concentrate on my dissertation.

Massachusetts sweep Judd Berg jokingly styles himself as "a Cape Cod Renaissance man" because of the variety of manual labor jobs he held before taking up the brushes. Other sweeps have come from the Armed Forces, nursing, accounting, the police, firefighting, public relations, public administration, universities and sales.

What is the common thread that interests people with such diverse backgrounds in plying a trade that requires climbing tall roofs and staring inside sooted chimneys? "Freedom," offered Gitlin, as we drove toward another appointment. "I go from job to job like a free-ranging cowboy or over-the-road

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Carting away bags of soot, in 1939 an English sweep shoulders the same brush-and-pole assembly that had been used for more than a century.

trucker. Who's still free in this country? Not many people."

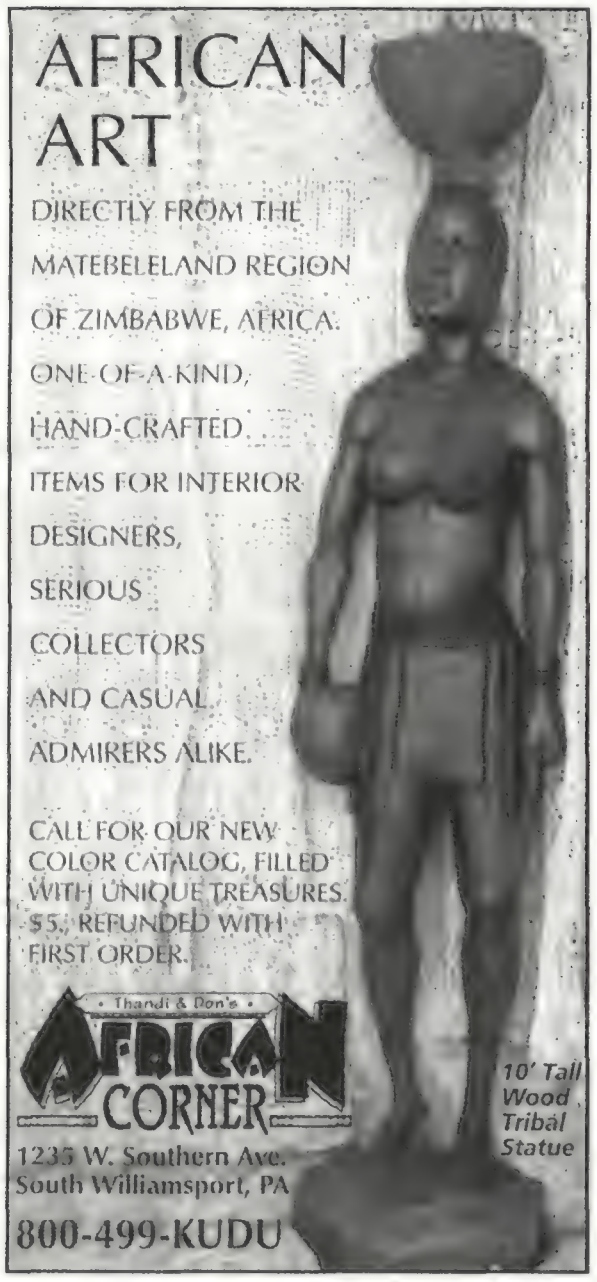
There's also excitement in the work that's not often encountered in a desk job. I remember climbing atop the steeply sloping roof of a two-story condominium in mountainous northern New Mexico, holding aloft my metal brush at the end of three connected, five-foot-long flexible poles, looking up to see storm clouds rushing at me and reflecting on my attractiveness as a lightning rod.

The job's hazards can obviously be extreme. During the blizzard of 1993, Kevin Crites, of K.C.'s World of Chimneys in the Boston area, went out to an old three-story farmhouse to fix a broken stovepipe. He put an S-shaped clamp—a ridge hook—up on the snowy roof to secure the ladder from ridge to roof edge, only to find, as he climbed the ladder on all fours, that there was ice under the snow. "The hook slipped, and the ladder went," he told me. Fortunately he had cleared the area below of tools before he went up. When he landed, it was in a six-foot snowbank. "It was like landing on an air bag."

Responsibility for the safety of customers weighs on the minds of many sweeps. According to Ron Markell, a thoughtful sweep with a fringe of red beard who works in Pennsylvania, "In one way, cleaning chimneys is a very light thing. But in another, it's very heavy. These people you just left are sleeping in that house. It's a heavy liability, both moral and legal."

Watching out for sweeps themselves, Jay Hensley publishes *SNEWS* to provide a national forum for sweep issues and has created a sense of extended family for chimney sweeps. In her floppy I-go-anywhere hat, Hensley travels the country with her son, Tim, as photographer and business manager, to report on the latest technology, and new products and laws.

At our next call, Jeff Gitlin and I were lying on our sides, our heads and shoulders in a fireplace, looking up the chimney. This was a world few people see, a rough landscape of dirty bricks, out-of-kilter clay tiles and partially missing mortar, put together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Gitlin's client, whose white walls were decorated with paintings, was interested in converting her fireplace from wood to gas logs. It's easier to open a valve than haul wood, and gas seems to give cleaner heat. There was a faint, smoke-blackened stain above the fireplace. The owner would be happy to clean it one last time. She had called Gitlin to clean and inspect the chimney before the conversion.

Gitlin, focusing a flashlight upward, viewed what he saw with distaste. "Look at this," he told me, pointing right above us. "Here's one reason why this chimney smokes. Three lintels."

It took me a moment to make sense of what I was seeing. Instead of a nearly vertical inner wall guiding the smoke upward to the damper, the long-gone mason, for whatever structural reason, had put three horizontal metal bars, level with one another, one behind the other, so that smoke toward the front of the firebox was blocked from rising. Smoke was being drawn toward the fire-heated horizontal masonry around the three lintels and rolling back into the room instead of up the chimney.

"The proportions look wrong, too," Gitlin observed. A rule of thumb is that fireplace openings should be

Free-climbing a roof, Gitlin carries a flexible fiberglass rod with brush.

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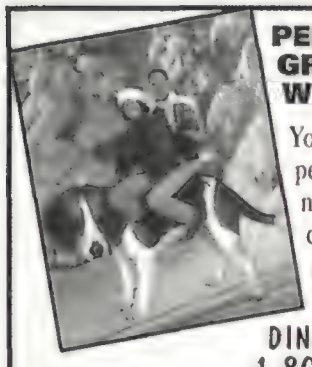

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A top-hatted sweep removes a furry intruder so he can begin cleaning.

about 10 to 12 times the size of the cross-section of the flue. If greater than that, so much air will rush upward that it may back up, the way too much water poured into a small funnel does, and "overflow" smoke back into the room.

We returned our heads and upper torsos to the living room, where our legs and feet had been resting on a cloth Gitlin had laid down to protect the rug against soot. He sat up and patiently warned the owner that the carbon monoxide produced by a gas insert might seep into the room just as smoke apparently did, except that carbon monoxide would be invisible. He had her attention. "You just struck a blow!" she cried. Should she still want to convert to gas logs, he recommended that she buy a carbon monoxide monitor; meanwhile, he suggested she install a smoke guard across the top of the fireplace opening to bring it into proportion, preventing smoke from puffing into the room.

The fact that soot buildup constricts flues and causes chimney fires has been understood for centuries. In castles and manor houses, flues were large, and men could go into them with brooms, sweeping out the soot.

To clean a smaller rural chimney, a farmer might tie a rope around a goose's neck or leg and lower the alarmed creature as its beating wings knocked down the soot. Other homeowners filled burlap bags with dirt and tried to push them through, the bag brushing off soot as it moved. The bags, unfortunately, sometimes broke or got stuck, blocking the flue. Some people, not understanding the danger of high heat to their chimneys, deliberately set chimney fires to burn their stacks clear of soot. This could be done "upon suitable wet days," decreed one city ordinance in 1795.

The danger of catastrophic fires in urban areas, with their close-packed thatched or wood-shingled roofs, led to a high demand for chimney sweeps beginning in the 17th century in European and American cities. But there was a problem. In England, architects began to design middle-class houses with fireplaces in every room, their flues made smaller so that several would fit into a single chimney. These flues were too narrow for an adult to climb through. So, very small children became human brooms.

Boys, and sometimes girls, as young as 4 used their elbows and knees—lac-

erating them during a callusing process that might take months—to boost themselves up the chimney and clean it with a small broom and scraper. Hesitant beginners might be prodded with pins stuck into their bare feet to make them climb. They routinely were forced to ascend within flues measuring 9 by 14 inches and sometimes as little as 8 by 9 inches. Records indicate that a number of children died in the sharp curves designed into some flues. "Climbing boys," as they were called, got stuck and were suffocated by the soot they had knocked down in the small space around them. Accounts of young chimney climbers, mostly black boys, in 19th-century America are just as horrifying.

In England, to end the abuse of climbing boys, a citizen group with a preposterous name was formed: The Society for Superceding the Necessity of Climbing Boys, by Encouraging a New Method of Sweeping Chimnies, and for Improving the Condition of Children and Others, Employed by Chimney Sweepers. While essayist Charles Lamb unsympathetically called it the "society with the affected name," its agitations and the inducement of prizes led to new tools for the trade.

With the exception of the large vacuums used by modern chimney sweeps to prevent houses from being soiled by airborne soot, the most basic sweep tool of today is remarkably similar to the one invented in 1803 by the English engineer George Smart (p. 101).

Smart's apparatus, which he claimed would eliminate the need for climbing boys, consisted of hollow wooden poles whose ends fit into one another. The lead pole had a brush made of whalebone splinters that was fastened to a cord that passed through the poles.

Adding pole to pole, a sweep would shove the device up the chimney. The brush was furled like an umbrella until the operator yanked the cord to open it. As the brush was pulled down, it scraped off soot, much like modern brushes. A cloth hung over the mouth of the fireplace prevented falling soot

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from blowing back into the house. A slit in the cloth permitted entry and movement of the poles.

Like any technological change, the invention had admirers and detractors. British Liberals pressed for legislation that would end participation of minors in the trade. The Earl of Lauderdale, however, spoke in the House of Lords in 1819 against the abolition of climbing boys because he believed the brushes didn't do as good a job. He spoke of a doctor's prescribing calomel to a patient because "calomel is like the climbing boys, it finds its way into every corner and cranny," while lesser medicines, like the imperfect devices, don't "follow all angles and turnings, but pass over many important parts untouched."

A quarter-century after Smart's invention, English chimney sweep and mason Joseph Glass made some improvements. Among his innovations were screw-on brass connectors for the rods, similar to those used today, which provided additional stability, and a wheel on the top of the brush to help it navigate sharp turns. The use of climbing boys was abolished in England by 1875, but in the United States it wasn't until the introduction of central heating that the exploitation of young children as chimney sweeps began to slowly diminish.

Today's chimney sweeps still use equipment similar to that of Glass and Smart, but they employ high-tech gear as well—powerful vacuum cleaners, even a video scanner that can scope out a chimney's innards. Sweeps have to learn how to upgrade chimneys and vents to deal with modern high-efficiency furnaces, whose corrosive emissions can eat away at the inside of a chimney and possibly cause carbon monoxide to back up into the house. To be certified by the National Chimney Safety Institute of America, sweeps are required to take competency tests covering a broad and sometimes surprising array of subjects.

At the Sturbridge convention 60 sweeps were asked to figure out why

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SNOWLION EXPEDITIONS

the fireplaces at an energy-efficient ski condominium mysteriously puffed back smoke at irregular intervals into many living rooms in the building. After a moment of silence, the instructor, National Chimney Sweep Guild's Peter Luter—a sweep himself—provided an answer. "The elevator did it. It sucked smoke into the rooms [by creating a vacuum] when it went up. But before the owners could get up to do anything about it, the elevator went down and the problem stopped."

Technology moves forward, but some parts of a sweep's job never change—for example, raccoons. Tony Barnet of Falcon Enterprises in Davenport, Iowa, has a fund of stories about the critters. The females like quiet, dark locations in which to nurse their offspring. Barnet has serenaded these mothers with amplified rock music and sirens, and bathed them in floodlights to persuade them to leave their chimney dens, but they aren't easy to convince. He's even used smoke bombs to drive a mother to the top of the chimney, where she is apt to hang from her paws, without leaving the flue, until Barnet snares her and deposits her safely on the ground. He has to hurry to keep her from climbing back in while he rescues the cubs—easier said than done.

Once when Barnet walked back to a house to remove the cubs, he was confronted by the mother raccoon, who stared at him balefully from a low-hanging roof directly above the front door. Barnet used the back door.

One of his sweep employees pushed a raccoon out a chimney from below with his chimney brush. When he went onto the roof to cap the chimney, he found that mama hadn't fled to a nearby tree but had crouched, hidden, behind the chimney. When the sweep approached, the raccoon, like a furry Clint Eastwood, stepped out to face her tormentor in a final showdown. The sweep dived from the roof. Barnet added casually, "It was only one-story."

In the fireplace of yet another house, Jeff Gitlin took down the damper and wire-brushed the back wall of the firebox. With a gloved hand, he reached up onto the smoke shelf to get the "big stuff" off. With a rotary brush—a wire brush on the end of a rotating flexible rod, powered by an electric drill—he cleaned the walls of the smoke chamber.

Next, he blocked most of the fireplace with a paper "dam"—a large section of paper taped to the sides and bottom—to decrease the fireplace opening, increase the upward draft and stop particles from bouncing out.

Finally, Gitlin fed a brush up the chimney, met resistance, pulled back. With each stroke he pushed the brush farther, clicking on another rod whenever he'd moved the brush six feet upward. He withdrew, jammed forward, pulled back. He vacuumed the air with his large sweeper to bring down floating soot.

There's no easy rule of thumb for when a chimney should be cleaned—it depends upon the kind and amount of wood burned, how long the cut wood has aged and the draw of the chimney. In general, dry hardwoods burn cleanest because they burn hottest and have little sap. But this particular fireplace had developed a defect: its masonry fireplace had separated from the house as each had settled.

Gitlin pointed at the cracked joint and advised the homeowner that it needed mortar. Otherwise, sparks, embers and live coals could fall through. Finished, he vacuumed off his pants and then his drop cloths, which he folded like maps.

There are no smudges on Jeff Gitlin's clothes at the end of the day—his truck doesn't even smell of soot. His cheeks are clean. In the old days brides would have kissed him on the cheek to bring good luck to hearth and home. Gitlin is not a believer in such superstitions, and he eschews the traditional top hat, but on occasion, when he's inspecting the inside of a fireplace and some little boy or girl is watching, something magical happens. He reaches up inside the flue and seems to pull out a palmed swatch of bright red cloth as though someone had snagged it there. Who could it be? Who had actually climbed down inside the chimney? Ridiculous. But Gitlin nods his head solemnly. He flutters the cloth. He looks at the fireplace again and says, "He's been here, all right."

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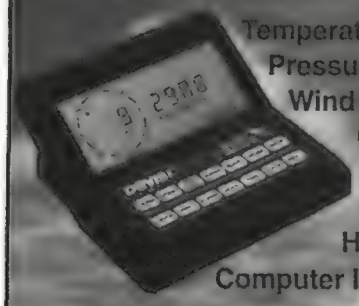

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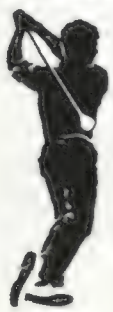

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Book Reviews

Daisy Bates in the Desert: A Woman's Life Among the Aborigines
Julia Blackburn
Pantheon Books, $22

"There was once a woman who lived in the desert." So begins, almost like a children's story, the extraordinary biography of Daisy Bates, a woman of Irish birth who, in 1913 at the age of 54, wandered alone into the wilds of Australia. There she lived for nearly 30 years with only the Aborigines for regular companionship, a people she came to call "My People."

At times the book seems more autobiography than biography as, with an artful and almost imperceptible sleight of pen, Julia Blackburn, one of Britain's acclaimed biographers, changes chameleon-like from author to subject and back again. At the same time Blackburn shifts seamlessly between past and present, creating a work as brilliantly alive and mysterious as the Australian desert where Bates spent most of her later life.

In the end, one wonders: Is *Daisy Bates in the Desert* really nonfiction—or is it fiction disguised as biography? Indeed, from artist Hilary Mosberg's haunting, dreamy cover illustration of a smiling, attractive woman seated alone on a stool in the middle of the Australian outback, holding, inexplicably, a human skull in her lap, to the author's final words, there is a mystical quality to the book that defies easy classification.

To further blur the lines between fact and fiction, the author announces up front, "Daisy Bates was a liar, of that I am sure." Though she assures the reader that "some of what [Daisy] says is true," Blackburn concedes that "a great deal is not and it is such an odd process trying to separate the person who she was from the person she would have liked to be, pulling the two apart and untangling their embrace."

Where does that leave the reader? Blackburn reveals early on that she is going to slip into the persona of Bates, and she does it with the ease of stepping into a pair of well-worn slippers.

"Here she is, speaking," Blackburn writes, "and if she says more than maybe she ever did or could say in a real conversation, that is because I am allowing her to speak with her thoughts just as much as with her voice." Later she writes, "At times I might catch myself off-guard and read one of her notebooks as if it was one of my own." She admits Bates has "inhabited a small corner of my mind for so long that it can sometimes seem as if I must have met her, but have simply forgotten the circumstances of our meeting."

Through the author's eyes and voice, Bates' descriptions and tales are so vivid and powerful that the reader quickly stops wondering, or even caring, whether it all really happened and equally quickly stops questioning whether this is Daisy speaking now, or Julia Blackburn. What does it matter who wrote: "I am Kabbarli, the white-skinned grandmother. I am the Great White Queen of the Never-Never and I have come from the Land of the Dead to help my people in their hour of need. I am also a lady from a very good family, you can see that immediately of course, hear it in my voice."

Julia Blackburn gleaned the information for her portrait of this remarkable and unconventional woman from interviews with people who knew Daisy Bates; from her letters, her published articles, her book, *The Passing of the Aborigines*—and from her many notes "scribbled on paper bags, old railway timetables, and even scraps of newspaper." But, Blackburn again reminds the reader, "very little of what this strange woman tells about herself is true. For her there were no boundaries separating experience from imagination; she inhabited a world filled with events that could not have taken place, with people she had never met."

There are indisputable facts that the book builds on. Daisy May O'Dwyer did exist. She was born in Ireland, probably in 1860, the child of impoverished parents; her mother died when she was young, and her whisky-guzzling father

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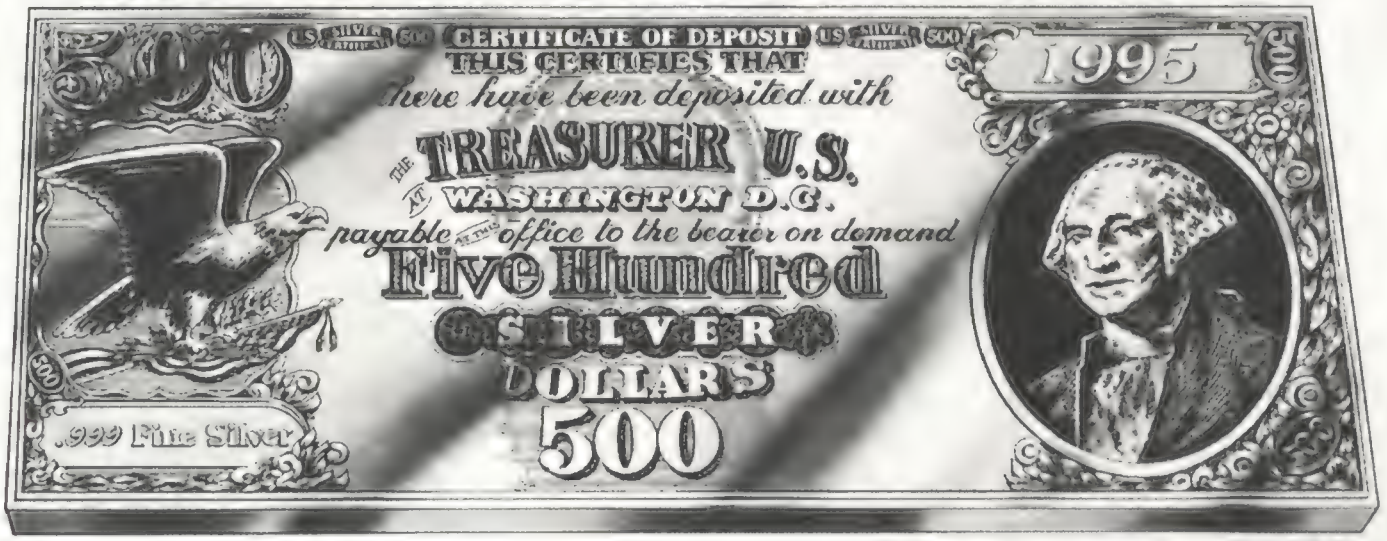

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ran off with another woman and died en route to America. Daisy was sent to an orphanage near Dublin. Attractive and well read, at age 18 she found work as a governess. A scandal in the household ensued; it's not elaborated upon but easily imagined. As a result, the young man of the house killed himself, and Daisy embarked upon her first voyage to Australia.

It didn't take long for Daisy to replace her unsavory history with a past of her own making. She re-created in her imagination a childhood home, Blackburn writes, "a beautiful house" that was "built of big blocks of yellow stone with deep windows and doors wide enough for elephants and she places herself right at the top of the broad sweep of the main staircase. Standing there in her sky-blue dress she pulls in the sound of laughter, the smell of woodsmoke from the fireplace mixed with the sweet smell of tobacco from her father's pipe, the barking of dogs, a pool of sunlight on the floor."

Though Daisy painted an equally elegant world of wealth and society during her early years in Australia, the facts uncovered by Blackburn are that she arrived there in 1883, basically penniless, and worked as governess on a cattle station in North Queensland. Records show that in 1884 she was married by a Catholic priest to a stockman working at the same ranch. A month after the wedding he was thrown in jail for stealing pigs and a saddle. The couple separated after his release, and they never saw each other again.

Apparently Daisy didn't trouble herself with an official divorce. Eleven months later, in New South Wales, she married Jack Bates, this time declaring herself a Protestant and a spinster—a wise deception, since in Australia at the time bigamy was punishable by several years' imprisonment.

Two years later she gave birth to her only child, a boy for whom she felt as little affection as she by now felt for her second husband. In a birthday book of Bates', Blackburn discovered that the page marking the son's birthdate had simply been torn out. "Just as she invented things that never happened," writes Blackburn, "she could also destroy the evidence of things that did."

In 1894 Bates abruptly returned to England—giving a different reason for the trip to everyone who asked. "It was five years before she felt ready to return to Australia," writes Blackburn. When Bates did return she was deeply disappointed by her reunion with her son and husband. She abandoned both and persuaded a priest she had met on the boat to let her accompany him to his mission at Beagle Bay, a flat and desolate area of swamps and mud flats far to the north, where he worked with the Aborigines. It was there that she first met the people who would become her family, her people and her life.

Charming the right officials, she secured a government grant and established a rough camp on an Aboriginal reserve a few miles east of Perth. There Bates began a decades-long study of the language and customs of a people whose culture and land, she realized, were being destroyed by white settlers. "I thought," she wrote of her two years at the Maamba Reserve, "that once I had made enough notes then I would have an important book that would somehow save the people from annihilation and I would be their saviour." It was a dream she never let go.

Much of the book describes Bates' surreal life among the Aborigines, a life far from the fantasies of her fabricated upbringing. "Those ticks were revolting," she wrote about the blood-gorging insects infesting the area near one of her camps. "I once had a whole string of them black and shining around my waist, like a belt. I tried to get them off by scorching them with a stick taken from the fire but when that didn't work I had to wait until they were well-fed and ready to drop of their own accord."

She felt keen kinship with the Aborigines who appeared at her camps, "naked, smiling, glistening in the sunshine." She claims to have been initiated into the ceremonies of the men and to have been almost totally accepted. "They told me that in the Old Times I had been a man, a tribal elder . . ." Bates wrote. "I have seen them dancing, dying, making love, giving birth and I have never once been excluded from what was happening, never once made to feel like an outsider gazing into a forbidden territory."

When she set up a camp in a new location, the Aborigines would see the smoke from her fire and know that the strange white woman—in Edwardian dress with her pins and stays and high white collars—the one they called "Kabbarli, the Grandmother," was there. She would tend their wounds, share what

little food she had, ask them the tales of their beginnings and write down all their words. There could be dozens camped around her for weeks. Then, one morning, she might wake and they'd be gone, sometimes leaving her without another human being to talk to for months.

Bates occasionally ventured back into the white world to present papers at government conferences, to argue for help for the Aborigines, once even to receive the Order of the Commander of the British Empire. "I am still not quite sure what powers of authority this gives me apart from being able to write CBE after my name," she noted at the time.

"I knew I had to be careful," she writes via Blackburn, "how I made the transition between the black and the white world. It has to be done in stages, like a diver in one of those metal capsules who is slowly pulled up out of the depths of the sea, pausing as he adjusts to the different weight of the air around him."

Her longest sojourn was at Ooldea, a lonely place in the middle of the treeless Nullarbor Plain of South Australia where her beloved Aborigines faced the greatest challenges to the life they once knew: the missionaries who wanted to convert them, and the new railroad that eventually stretched across Australia from coast to coast.

For reasons Daisy never understood, "the Line," as the transcontinental railroad was called, attracted hordes of wandering Aborigines. "I lit fires to send signals to the new arrivals so that they came to me first and I could prepare them in some way for the changes they would have to confront . . . but I could never persuade them to return to the places they had come from. They were all hypnotised by the metal snake."

Daisy hated the train for what it did to her people: turning them into beggars and prostitutes, as they hung around the Line being corrupted by what she called the "low whites" who worked for the railroad. "My People. When you see them walking naked out of the desert they appear like kings and queens, princes and princesses, but standing barefoot on the edge of the railway track, dressed in stiff and stinking clothes, black hands held out to receive charity from white hands, then they are nothing more than derelicts, rubbish, that will soon be pushed to one side and removed. My poor people,

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how will they manage once Kabbarli has gone?" She never doubted she was the only means of their salvation.

Though few places on Earth are as bleak as Ooldea, where Bates camped alone for 16 of her outback years, she found beauty all around her. "Sometimes a cloud of white cockatoos falls out of the sky and lands on me as if I was a tree laden with fruit," she says. Lizards were her favorite creatures. "I . . . had a bicycle lizard who . . . became so tame that he would creep up onto my lap and sit there, basking and catching flies."

Every day she felt compelled to push on with her attempt to document the Aborigines' language and their myths, even as the sand slowly crept behind her eyelids to ravage her eyesight. "There are still hundreds and hundreds of words that I have to write down because if I don't do it they will be gone forever. I hate to think of words being lost like that, cut away from the things they are tied to, evaporating into silence." Later, she described one of her Aborigine women who, she says matter-of-factly, was "a prostitute along the Line . . . and when she gave birth to a half-caste she killed him and ate him."

At the age of 76, Bates left the "bleak, hot, red hills of Ooldea . . . a place where she once knew a contentment she could not know anywhere else," for Adelaide, and ultimately published her book, *The Passing of the Aborigines.* She was never happy in the cities, though, and clung to her dream of returning to Ooldea. "Then," she foolishly believed, "her people would be happy to resume the old life and would forget about the trains and the Line."

"There is no station here now, no platform, no buildings" at Ooldea, Blackburn writes, "nothing that makes this into a place at all except for the strange memorial to Mrs. Bates, looking like a post box that has lost its human purpose and has been left stranded in this enormous landscape." "1860-1951" reads the inscription. "Daisy Bates devoted her life here and elsewhere to the welfare of the Australian Aboriginals."

Daisy says it better. "I never failed them, no, not for one hour of my time with them. . . . I always wanted the whole of my life with them." Truths, half-truths and fabulous lies—it's a life worth reading about.

Per Ola and Emily d'Aulaire write from their home in Connecticut.

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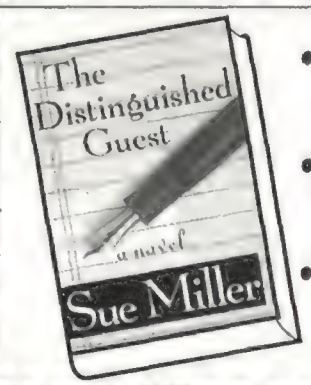

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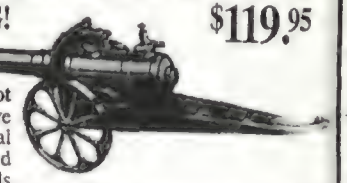
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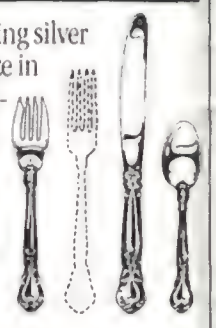
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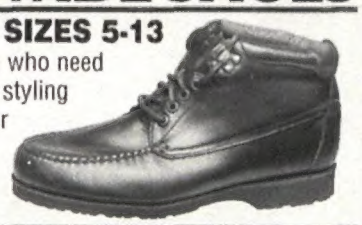

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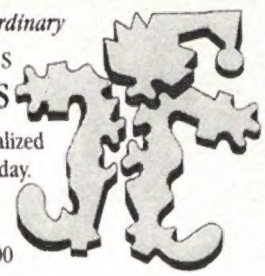

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By Robb White

If you reckon your own cousins are weird, wait till you meet Ned and Bessie

I have two unusual cousins—Bessie, who lacks nerve, and Ned, who has plenty of nerve but never does anything right. Since they have always spent a lot of time together, it was probably inevitable that one day they were going to end up in trouble.

Bessie is an unlikely candidate for trouble. She has been the assistant librarian in our small town for 50 years. She has a way of working in the stacks so she always seems to be hidden on the other side, sort of like a squirrel on a tree. I used to tease her as a boy by sneaking back there and peeking around a corner. I think one of the things that has made life so easy for me is the memory of the way she'd smile when she discovered me watching her.

Bessie is afraid of anything she didn't know about when she was a girl. That includes television, supermarkets, the telephone and all machinery. When she needs to go someplace, she relies on Ned to take her, and he is usually happy to oblige. My grandmother always used to say, "Poor Ned can't do anything right, but at least he drives slow."

Ned volunteered once to put Formica on Grandmother's kitchen cabinets. He forgot about the pilot light on the stove, and after he opened a gallon of contact cement a tiny blue flame ran up the vapor trail and set the stuff on fire. Ned picked up the can and hurried out with it into the yard, where a bit of flaming glue slooped onto his dog. The dog thought the whole thing was a game until he caught fire. Then the poor thing ran back into the house and hid under the bed. When it was all over, the dog was fine. He smelled of singed-hair for a while, but that was nothing compared with the smell of the burned-up rubber mattress on Ned's bed.

One thing that Ned could do pretty well was gnaw things with his front teeth. I remember that when he was about 12 he gnawed a boat from a stick he found down in the creek. Turned out that the nice soft wood he gnawed the boat from was poison sumac. It was not long before Ned's lips and tongue swole up so bad that they had to take him to Atlanta to see a specialist.

Ned made quite a few such trips. When he was little he stuck a peach pit up his nose and couldn't get it out. On that train ride to Atlanta, he and my aunt found themselves sitting across from another mother with her little boy. The child had an enormous bandage on his head, much bigger than a turban, which didn't stop him from being badder than hell. Finally, when he started crawling over the back of the seat in front of him, his mother whopped him a good one on his rear end.

My aunt, an active social reformer and self-taught medical expert, was compelled to reprimand the woman. She said, "Madam, I hope you know how dangerous even the slightest blow can be to a child with a hematoma of that size."

The woman replied, "Lady, there is nothing at all wrong with my son. He just got his head stuck in his potty, and we are going to Atlanta to have it removed. I put that bandage on to keep people from becoming involved in something that is *none* of their business."

Ned considered himself a rocket pioneer. He made one rocket big enough to carry a camera. Upon ignition, it hopped off the launching platform and lay on its side fizzling. We all felt relieved. Then it began to squeal and spin around. Finally it took off along the ground and ended up beneath my mother's Volkswagen, where it exploded. It made such a dent in the belly pan that the emergency-brake handle wound up waist high, and the front seats tilted outward so much that they gave you a cramp in the hip.

The trouble Bessie and Ned got into started on just another trip to the grocery store. They were driving down the street when they came to the curve by Charles Robinson's house. Ned braked to slow from 15 to 5 miles per hour so that Bessie wouldn't clutch her pocketbook even harder. The pedal went all the way to the floor with no effect. Even though there was only a gentle curve in the road and no traffic at all, Ned did the wrong thing. "Jump, Bessie!" he hollered, and with that he opened his door and dove out on his head.

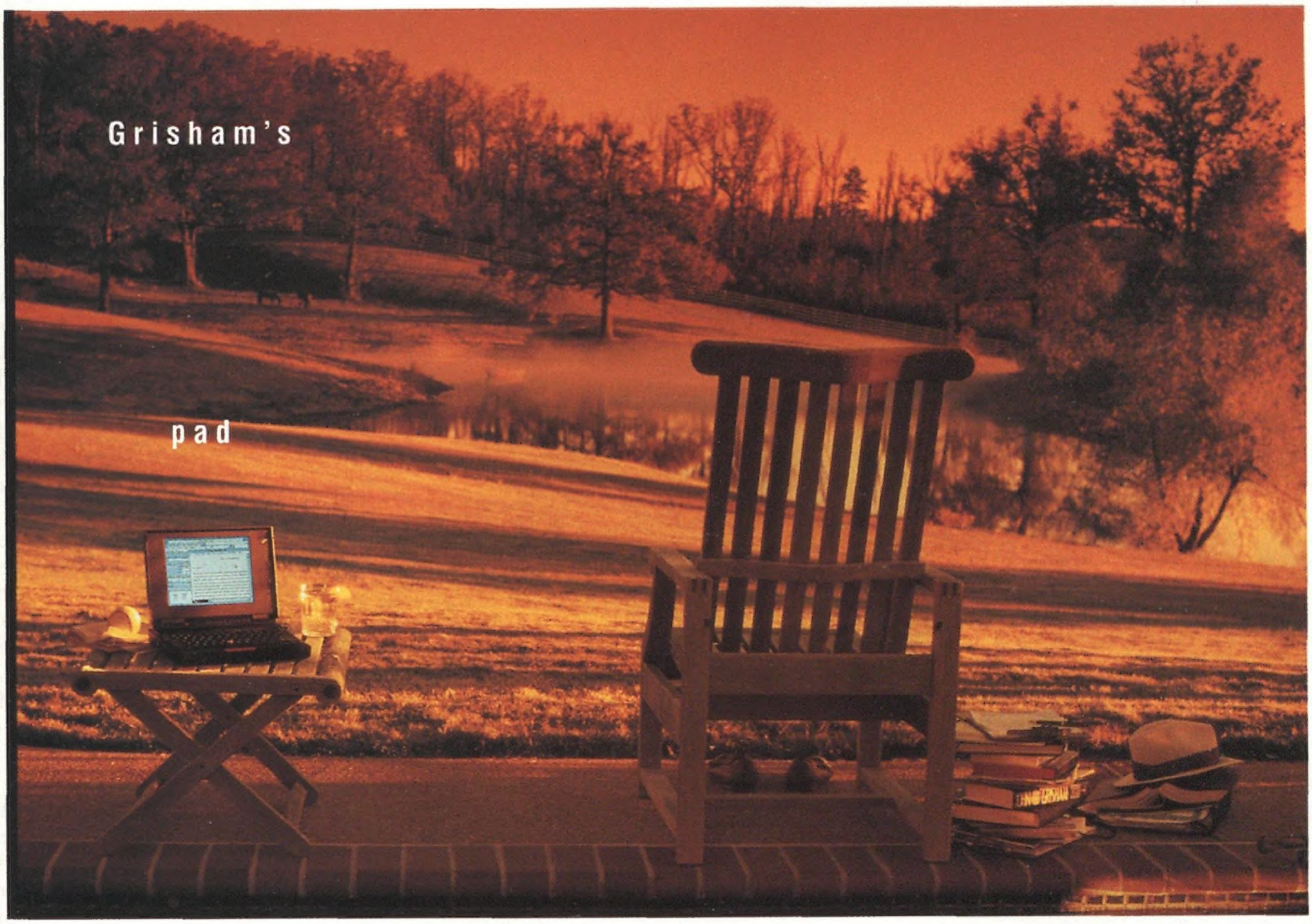
After Ned bailed out, Bessie remained frozen in her seat. The car jumped the curb and ran through the big pittosporum bushes that border Charles' yard. It passed Charles on his riding lawn mower in his dark glasses and ran into his big fancy metal-flake bass boat, knocking it clean off the trailer onto the garbage cans.

Charles came stomping through the cloud of whiteflies stirred up by the passage of the car through the bushes. By the time he finished examining the destruction of his boat, he had worked himself up into a regular fury. He looked around for somebody to blame. There was only poor old Bessie, still strapped into the passenger seat and clutching her pocketbook. Charles leaned into the car window and roared right into Bessie's ear, "*What the hell do you think you're doing?*" Bessie didn't have the nerve to answer.

Later, in the hospital, Ned said that he had planned to roll himself into a ball (he had read somewhere that rolling yourself into a ball is the proper method for "bailing out" of a car), but he hit his head on the pavement before he could assume the position. It didn't kill him, but he did have to wear a great big bandage on his head (much bigger than a turban) for a long time.

(*John*)

With an iced tea on the back porch of his Mississippi home. In the quiet writing space above his garage. Even at the baseball diamond where he coaches the "Mighty Marlins," his son Ty's Little League team. Author *John Grisham* can take his new IBM ThinkPad® 360CE anywhere to work on his next big idea. Whether it's for a new novel, or, more importantly, for the Marlins' crucial '95 season opener.



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